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ENVIRONMENTAL PROTECTION AGENCY

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HEALTH ASPECTS OF PESTICIDES ABSTRACT BULLETIN is a monthly publication of the Technical Services Division of the Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides on humans. The publication represents a monthly review of more than 1150 domestic and foreign journals. Subjects and authors of abstracted articles are cross-referenced in an annual index issue. Reprint requests should be directed to the author of the complete article.

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72-2497. Anonymous. **[On the recent amendment for the enforcement of "Poisonous Substances Regulation Act."]** *Aromatikkusu (Aromatics) 24(8): 400-401; 1972.* (Japanese)

In Japan harmful chemical substances except drugs are assigned to three categories based on their acute toxicities to mammals through oral, cutaneous, and intraperitoneal tests. Additions and corrections will be in effect and enforced starting August 1, 1972. These include: dimethyl isopropylthioethyl dithiophosphate and formulations containing > 4% are designated as "poisonous substances." Formulations containing < 4% are considered "moderately toxic substances." Calcium and iron methanearsonates and their formulations are changed from "poisonous substances" to "moderately toxic substances;" 2-(phenyl-*p*-chlorophenylacetyl)-1,3-indandione and its formulations containing < 0.025% are considered "moderately toxic substances;" 3-methyl-5-isopropylphenyl *N*-methylcarbamate (promecarb) and its formulations are designated "moderately toxic substances" as are diethyl 5-phenyl-3-isoxazolyl thiophosphate and its formulations. Except for calcium and iron arsonates, these chemicals are controlled by the "Agricultural Chemicals Regulation Act."

72-2498. Papworth, D. S. (Pest Infestation Control Lab., Min. of Agr., Fish. and Food, Hook Rise South, Tolworth, Surrey, England). **Pesticides and ecology.** *Bull. Entomol. Soc. Amer. 17(1): 9-14; 1971.*

The users of pesticide chemicals in the United Kingdom are protected by voluntary safety schemes: the Pesticides Safety Precautions Scheme and the Veterinary Products Safety Precautions Scheme, and the Agriculture (Poisonous Substances) Regulations. Their three policies are: the "need to use" principle; the use of less persistent alternatives; the discouraging of certain chemicals and methods of application. Data from both laboratory and field trials on the occurrence and levels of pesticide residues in foodstuffs have been obtained; residues of organochlorine pesticides measured in the total diet in England and Wales from 1966-1967 did not exceed standards set by the FAO/WHO Joint Committee on Pesticide Residues. A voluntary ban on the use of aldrin, dieldrin, or heptachlor insecticidal seed dressings for spring sown cereals in 1961 reduced the number of bird poisonings. Laboratory and field studies measure the potential hazards posed by pesticides to wildlife. The Fish Testing Service sponsored by the Salmon and Freshwater Fisheries Laboratory of the Ministry of Agriculture, Fisheries, and Food helps determine fish toxicity.

72-2499. Anonymous. **Prevalence, impact of PCB's probed.** *Chem. Eng. News 50(37): 28-30; 1972.*

Polychlorinated biphenyls (PCBs) appear to have been distributed throughout the biosphere. They have been found in water samples in national parks and forests and in fat of polar bears less than 400 miles from the North Pole. Samples of human adipose tissue from every hospital and city in the 18 states and the District of Columbia included in the Environmental Protection Agency's human monitoring survey contained PCBs. More than 2 ppm were found in 7.6% of the samples. Between 1-2 ppm were found in 29.7%. Although PCBs have low acute toxicity in fish, many are acutely toxic to invertebrates in the fish food chain. Because of accumulation in tissue, chronic exposure to low levels (<1 ppb) can cause injury or death in fish, crustaceans, and other aquatic life. Addition of PCBs to hens' diet caused a dramatic drop in egg hatchability. PCB levels in Great Lakes' salmon were apparently responsible for the sharp decline in mink kits observed on ranches dependent on the salmon as a food source. New FDA guidelines for PCB residues in food should provide a margin of safety for humans. Restrictions on use of PCB will allow for a gradual decline of residues in the environment.

72-2500. Rudd, R. L. (University of Calif., Davis, CA). **Pesticides.** *In: Environment. Resources, Pollution and Society. W. W. Murdoch, ed., Sinauer Ass. Inc., Stamford, 1971, pp. 279-301.*

The reasons for chemical pest control and the environmental consequences of chemical use are discussed. Pest levels of many species have been created mainly by their intentional or unintentional transport to areas lacking predators or parasites and by large-scale monocultural plantings which decrease the diversity of species in an area. Chemical pest control further reduces the biological diversity. Lack of selectivity and lack of controllability are the two major drawbacks of chemical pesticides. Nervous control is often the physiological target of insecticides. Growth accelerators make up the largest number of herbicides. Risk determinations based on acute toxicities and threshold levels have little validity in ecosystems or even in the realm of human health. Air and water transport of pesticides, particularly the persistent ones, is resulting in almost universal distribution. Biological magnification has been established for many compounds. Banning of all pesticides whose toxic effects cannot be confined to the site of application is recommended, with remaining risks being the responsibility of the pest control practitioner.

72-2501. Conway, G. R. (Environ. Resour. Manage. Res. Unit, Imp. Coll. of Sci. and Tech., London, England). **Better methods of pest control.** *In: Environment. Resources, Pollution and Society. W. W. Murdoch, ed., Sinauer Ass. Inc., Stamford, 1971, pp. 302-325.* (32 references)

Underlying causes of pesticide failure and features of more efficient, less hazardous alternatives are discussed. Resistance of pests to one compound after another developed rapidly. Repeated application hastens

the development of resistance, particularly in species which breed throughout the year. Insects which develop resistance to an organophosphate, a carbamate, or an organochlorine generally are resistant to other compounds within the same group. The action of pesticides is not density-dependent as is the natural regulating mechanism. A certain percentage of pests are killed by each application. Pesticides also interfere with natural regulation by affecting predators or parasites. Skilled use of pesticides through pest monitoring, careful timing of application, and selection of systemic poisons can reduce the hazards and more efficiently control pests. Introduction of new species of natural enemies, development of pest-resistant plants, reduction of the "carrying capacity" of the pest's environment by partial destruction of the breeding sites or some other means, or a combination of these can greatly reduce or eliminate the need for chemical pesticides. Genetic control may offer means of eradicating pest species. Drawbacks and deleterious effects of these alternative control measures must be examined carefully before their use is justified. Integrated control programs, which take into consideration the pest situation as a whole, have been quite successful, but have come about mainly after a crisis situation. The sheer complexity of ecosystems had discouraged development of integrated programs with each new crop. Recently, however, ecologists have devised relatively simple techniques for gathering and analyzing information, and methods of systems analysis and computers are being used to further analyze data and plan control programs.

72-2502. Tudge, C. (Author address not given). **The dieldrin dilemma.** *Farmers Wkly. 74(15): 52-53; 1971.*

The adverse versus the beneficial effects of dieldrin used in sheep dips to prevent fly strikes in Scotland are debated. A 1956 report indicated that dieldrin becomes trapped in the wool grease rather than in the wool itself; others showed how dieldrin migrated through the grease down to the skin. A trial done in 1958 concluded that the log of the dieldrin concentration in the sheep's fat was directly related to the time after dipping. A 1962 investigation of 61 samples of kidney fat from slaughtered ewes of 21 different abattoirs found up to 10 ppm of dieldrin. In 1964 the Advisory Committee on Poisonous Substances used in Agriculture and Food Storage recommended that dieldrin use be curtailed. Finally, in 1966, the government restricted the use of both aldrin and dieldrin under the Veterinary Products Safety Precautions Scheme. Since dieldrin does have a long-lasting effectiveness and prevents head strikes, it is suggested that sheep farmers be allowed to use dieldrin either once a year or on the ewes to protect their flocks.

72-2503. Keane, W. T. (Author address not given). **The elimination of persistent economic poisons. The balancing of equities.** *Food Drug Cosmet. Law J. 27(6): 383-392; 1972.* (11 references)

Agencies involved in regulation of pesticides can achieve an advantageous benefit/risk ratio only when they have been granted a significant amount of discretion. Federal regulations give the Secretaries of HEW and USDA the discretionary authority to prevent potentially hazardous pesticides from being put into use and to remove existing chemicals from the market if, in their judgement, an imminent hazard to the public exists. A system of checks and balances allows the affected party to challenge the decisions. The case of DDT illustrates the complexities involved in regulation of pesticides. Its use has been extremely successful in eliminating malaria and other insect-borne diseases; its effect on world food production has been great. Until the problem of increasing population and increasing world food requirements is solved, the demand for pesticides will remain. The Secretary of HEW, in establishing tolerances for pesticides, is required to consider the necessity for an adequate food supply, other ways in which the consumer might be affected by the pesticide, and the agricultural usefulness of the compound.

72-2504. Atabayev, Sh. T.; Geller, I. M. (Uzbek Sci. Res. Inst. of Hyg. and Occup. Health, Tashkent, USSR). **Osnovnyye voprosy gigiyeny planirovki sela v usloviyakh zharkogo klimata Uzbekistana. [The main problems of hygiene in the planning of settlements under conditions of a hot climate.]** *Gig. Sanit. 36(1): 3-6; 1971.* (Russian)

General and hygienic aspects of village planning in the Uzbek agricultural areas are reviewed regarding the protection of residential areas from the possible action of pesticides. Pesticides such as methyl mercaptophos, metaphos (methyl parathion), carbofos (malathion), butyphos (DEF), and DDT were detected at distances of 750-800 m when applied by tractors, and up to 1,500 m when applied from airplanes. Pesticide concentrations in air above the maximum allowable values were determined in residential areas 3-5 days after application. DDT residues on cabbage leaves and peaches in villages exceeded the maximum allowable levels by 150-250%, even though the use of DDT in the USSR is prohibited. Protection zones 750-1,000 m wide are needed between pesticide-treated farming and residential areas. Hexachlorocyclohexane (BHC) and methylmercaptophos should be replaced by less toxic, easily degraded pesticides; the use of airplanes for the application of pesticides over densely populated areas should be prohibited.

72-2505. Manescu, S. (Catedra de Igiena Generala si Comunala, Inst. Medico-Farmaceutic Bucuresti, Bucharest, Rumania). **Valoarea metodei manometrice in studiul potentialului de actiune a micropoluantilor chimici asupra florei autopurificatoare din apa. [The value of the manometric procedure in studying the chemical micropollutant action potential on the self-purifying water flora.]** *Igiena 20(5): 275-286; 1971.* (26 references) (Rumanian)

Decreased oxygen consumption by the self-purifying bacterial flora in surface water samples occurred after treatment with 100 mg/l of BHC, parathion, or DNOC. Determinations were performed by the micromanometric Warburg procedure. Significant inhibition of oxygen consumption occurred in the presence of high parathion and low BHC concentrations. Pesticides ranked among the low inhibitory action compounds compared to other pollutants, metals or cationic detergents. Chlorine produced 200 times greater inhibition of oxygen consumption by the bacterial flora than the three pesticides. Copper combined with organochlorine pesticides increased the inhibitory effect by 4.2%. The validity of the manometric procedure for determining the bacterial oxygen consumption (as related to pollutants) was verified on activated sludge samples. The procedure is suggested for establishing maximum allowable pollutant concentrations in surface waters.

72-2506. Bridges, B. A. (M.C.R. Cell Mutation Unit, Univ. of Sussex, Falmer, Brighton, BN1 90H, England). **Screening for environmental agents causing genetic damage: introduction.** *Lab. Pract. 21(6): 411-412; 1972.* (9 references)

Over 30% of the patients admitted to a large American children's hospital were suffering from diseases which could be attributed wholly or partially to genetic causes. Most mutations are probably masked by the dominant and wild-type character in the duplicate chromosome, so that a steady accumulation of mutations can occur without being detected until a substantial deterioration in genetic stock has occurred. Although the hazard from radiation has been recognized for many years, screening for potential chemical mutagens in food additives, pharmaceuticals, and pesticides has just begun. In the future it is likely that in these three categories freedom from mutagenicity will have to be demonstrated; laboratory mutations have been observed with compounds of each group. The specific locus test in the mouse is probably the best test available, but is too expensive and time consuming for routine screening. Simple cellular systems are the most suitable for demonstrating heritable gene mutations.

72-2507. Nichols, W. W. (Dept. of Pediat., Univ. of Pennsylvania, Philadelphia, PA). **Mutations as environmental hazards.** *Laekartidningen 69(23): 2785-2788; 1972.* (20 references)

In a general review of environmental agents likely to produce mutations or permanent heritable damage to the genetic material, a number of chemical agents are considered. Concern is focused on chemicals to which the population is exposed daily, such as additives, drugs, insecticides, and biologicals, as well as on air and water pollutants with the same potential. Chromosome abnormalities have been seen in drug users and the likelihood that similar damaging factors may be present in insecticides is discussed. In the Mrak report on insecticides it was pointed out that one of the greatest responsibilities of our generation is our temporary custody of the genetic heritage. A scientific group, convened by the WHO on the evaluation and testing of drugs for mutagenicity, recommended that a positive finding in a species indicates a potential mutagenic activity in man. Procedures are outlined for tests, and emphasis is placed on their standardization.

72-2508. Gustafsson, M. (Dept. of Plant Pathol. and Entomol., Agr. Coll. of Sweden, Uppsala, Sweden). **Alternativ till insekticider. [Alternatives to insecticides.]** *Laekartidningen 69(23): 2828-2833; 1972.* (10 references) (Swedish)

Achievements, studies, and perspectives in the field of biological insect control as an alternative to insecticides are reviewed with special regard to vectors and parasites in man. The results achieved in this area are less spectacular than in forestry, agriculture, or horticulture. The use of natural enemies of insects is one of the most effective control methods; others are biochemical agents such as baits and repellents, irradiation or chemical sterilization, and antibiotics. Larvivorous fishes *(Gambusia* and *Poecilia (Lebistes),* bacteria *(Bacillus thuringiensis, B. sphaericus),* species specific viruses, fungi *(Coelomomyces, Entomophthora, Aspergillus, Macrosporium*), protozoa, especially sporulating species and microsporidia, as well as nematodes *(Neoplectana carpocapsae)* are the basic insect enemies which may be used in biological control. Several of these natural enemies have been used successfully; e.g., viruses, *Entomophthora, Bacillus popilliae,* and *B. thuringiensis*, while others proved to be promising in field trials. Further studies into the pathology of insects, and tests on new preparations and methods of application are required. Biological control can be used, apart from arthropoda, also against weeds, algae, and molds.

72-2509. Sigurdson, J. (Sci. Policy Res. Unit, Nuffield Bldg., Univ. of Sussex, Brighton, England). **China: recycling that pays.** *Laekartidningen 69(23): 2837-2841; 1972.*

An article on the control of pollution in China includes some comments on the use of pesticides. Increasing amounts of pesticides have been made available through the development of the chemical industry during the past decade. DDT and similar chemical compounds have been and are still widely used. A new pest control method is being developed which will use parasitic wasps which feed on the insects' eggs to destroy pests harmful to rice. Large scale experiments are now being carried out on the use of biological methods to prevent and deal with insect pests attacking grain, industrial crops, and trees. Another form of plant protection uses neon strip lights with a special coating. The emitted light

has a wave length which attracts certain insects harmful to crops; the insects are then killed with chemicals.

72-2510. Moore, N. W. (Author address not given). **A synopsis of the pesticide problem (abridged).** *In: Man's Impact on Terrestrial and Oceanic Ecosystems. W. H. Mathews, F. E. Smith, E. D. Goldberg, ed., MIT Press, Cambridge, 1971, pp. 144-172.* (111 references)

The nature of the pesticide problem is described in terms of ecological effects. Pesticide applications always affect a highly complex, little understood system although they are intended to control specific species. Most are non-specific and their effects are density-independent. Pesticide interaction or potentiation has not been extensively studied, and most of the research on pesticides is a reflection of a particular interest in vertebrates or arthropods, rather than in the whole ecosystem. Generally, pesticides reduce diversity and may affect population since they have differential effects on taxa at different trophic levels. Complete control of very simple systems and integrated control of complex systems will probably be future trends in pest control.

72-2511. Brown, Jr., J. F. (Author address not given). **Phosphates, heavy metals and DDT: pollution control costs and implications.** *In: Man's Impact on Terrestrial and Oceanic Ecosystems. W. H. Matthews, F. E. Smith, E. D. Goldberg, ed., MIT Press, Cambridge, 1971, pp. 489-498.* (6 references)

Industry is responsible for the major portion of heavy metal pollution. Removal is easier to accomplish at the source, before dilution, and is generally inexpensive. It has often been neglected because of lack of knowledge of the potential hazard that exists. Establishment of water quality standards, surveys and monitoring, registration of users of heavy metal salts and mercury, and enforcement of these would be effective controls. DDT has been used widely because it is efficient, effective, and cheap. Minimization of use, improvement of application equipment and formulations, substitution of non-persistent chemicals (a costly, uncertain undertaking), use of nonchemical controls, and eradication of primary pest species could reduce the problem of DDT pollution. Requirement of an FDA-type clearance of all commercial chemicals is not recommended since 99% of the industrial chemicals do not accumulate and are produced only in small volume. Some cost to the taxpayer would be involved in controlling the pollutants discussed.

72-2512. Taubenfeld, R. F. (Author address not given). **DDT: the United States and the developing countries.** *In: Man's Impact on Terrestrial and Oceanic Ecosystems. W. H. Matthews, F. E. Smith, E. D. Goldberg, ed., MIT Press, Cambridge, 1971, pp. 499-518.* (15 references)

Divergent views are held within the scientific community concerning the implications of the continued use of DDT. Use in the U. S. is gradually declining because of development of insect resistance, introduction of less persistent chemicals, and concern about the risks involved. USDA has recommended use of nonresidual methods of control when available and use of DDT in minimum effective frequencies (1969). Production, however, has increased and nearly 80% went for export in 1968. In developing nations the cost of DDT represents a much greater proportion of the farmer's expense, and it is unlikely that more expensive, and ecologically more preferable chemicals, will be substituted. The public health uses of DDT outside the U. S. include control of vectors carrying malaria, sleeping sickness, and yellow fever; resistance to the chemical has prompted discontinuation of its use in many areas. High cost and other limitations of replacement chemicals pertain to the public health field as well as agriculture. Malaria eradication would be seriously hampered if the US were to ban the product or withdraw funds from the program. An integrated program of pest control is recommended to eliminate all target organisms since greatly increased amounts of DDT are necessary to eradicate 100% instead of 90% of the organisms. Greater U. S. and international research into better alternatives to DDT and subsidy of the use of environmentally preferable alternatives are needed in the interim.

72-2513. Ellerbruch, V. G.; Dahlgren, R. B. (S. Dakota Co-operative Wildl. Res. Unit, S. Dakota State Univ., Brookings, SD 57006). **An electronic system used for studying insecticide effects on pheasants.** *Med. Biol. Eng. 10(4): 567-568; 1972.*

An electronic system using optical detectors and digital recorders was developed to tally bird-feeding activities. This system was designed to test the effects of insecticides on the learning-relearning behavior of pheasant chicks. By using colors around the feeding opening, chicks can be trained to find food at a particular color of door and to find no food at another color. A change in feed cups from one color to another presents the relearning situation which may or may not be insecticide affected.

72-2514. Stokinger, H. E. (Nat. Inst. of Occup. Safety and Health). **Sanity in research and evaluation of environmental health.** *Med. Bull. 32(1): 38-49; 1972.* (28 references)

Rules are outlined for judging environmental pollution in a realistic manner. Standards should be based on derived scientific facts. Formal documentation and communication through the news media of standards, guides, limits, and the criteria on which they are based must be made to prevent unnecessary alarm. Standards should not be so severe that they cannot be realistically met. Tolerance levels should be determined by finding dose-response relationships over the range of one or two

logarithmic decrements and increments around the national average level, and by fixing the tolerance at some point below the no-effect level. Repeated sampling of the population is necessary. The Delaney clause concerning carcinogens must be interpreted with informed scientific judgment. Compounds such as DDT and mercurials for which there are no good substitutes should not be banned unless it is clear that human health is in imminent danger.

72-2515. Gunn, D. L. (Chilham, Kent, England). **Organochlorine propaganda.** *Nature 238(5359): 116; 1972.* (5 references)

A Letter-to-the-Editor describes much of the organochlorine literature as propaganda. The Wilson Committee, the Neuberger Committee, and the Mrak Committee are cited as groups who have indicated that there is not sufficient evidence to establish a direct effect of organochlorines on reproduction of birds. An alternative hypothesis is suggested. Attacks on predatory birds with trap, poison, and gun during an increase in gamekeeping could be responsible for some of the declining populations.

72-2516. Tinker, J. (Author address not given). **The Vapona dossier.** *New Sci. 53(785): 489-492; 1972.* (15 references)

Data withheld for two yr by Shell concerning the safety of Vapona have been released to *New Scientist.* It has been suggested that Vapona could substantially lower ChE, expose the housewife to more than the WHO/FAO acceptable daily intake of dichlorvos, and have some mutagenic activity. In Shell field tests in which 200 strips were hung by householders, dichlorvos concentrations in air were generally less than 0.05 μg/l. Maximum concentration recorded was 0.3 μg/l. It is conceivable that under certain conditions exposure could be four times the recommended daily dose. A linear relationship was observed between plasma ChE and dichlorvos concentration starting from exposure of 600 min to 1 μg/l and continuing until ChE was reduced 87%. Little change in other physiological variables was observed in volunteers exposed for 65 min to 53 μg/l. At high exposures some depression of red blood cell ChE was noted. In 6 mo field studies plasma ChE returned to normal during exposure. Other investigators have found that dichlorvos inhalation can depress brain ChE. Toxic effects of organophosphates have been shown to increase with high temperature, lack of exercise, and poor food. Long term inhalation studies have not been completed so that the question of mutagenesis, teratogenesis, or carcinogenesis cannot be fully answered. Other questions arose concerning Britain's evaluation of pesticides and whether or not, even if safety were established, a chemical should be put unnecessarily into the human environment. The American Medical Association Committee on Pesticides and the U.S. Assistant Surgeon General do not favor continuous pollution of the atmosphere unnecessarily. Some sections of industry and several national governments are now recognizing the need for a less confidential method of approving pesticides.

72-2517. Anonymous. **Crop sprayer cuts down agricultural pollution.** *New Sci. 54(792): 140; 1972.*

Small, portable pesticide sprayers, developed by Pan-Britannica Industries Ltd., may markedly reduce the volume of pesticide used in agriculture. A whirling disc spins off the pesticide in droplets of 50-110 μm, eliminating drift of tiny droplets and waste of larger droplets accompanying conventional sprayers. Since the apparatus works best with oil-based materials, 11 oil-based pesticides have been developed, one of which contains resmethrin, chemically related to pyrethrin. The sprayers also appear to be useful for vaccination against fowlpest.

72-2518. Anonymous. **Committee recommends continued uses of aldrin/dieldrin.** *Farm Chem. 135(7): 30; 1972.*

The Aldrin/Dieldrin Advisory Committee's report to the Environmental Protection Agency has approved the application of these pesticides directly to soil or to material buried in soil. It also recommended that the economic impact of total withdrawal of the two compounds be explored in depth. Wherever economically feasible, alternate methods of control should be used, especially in aqueous environments. Also recommended was formation of a committee of experts in chemical carcinogenesis to determine the effect of dieldrin on at least two vertebrate species. Application by aircraft, foliar spraying or dusting, discharge of residues into waterways or settling ponds, use in housing for humans and animals, and use on turf except as supervised by trained persons should not be allowed. The environment should be monitored over a number of years to determine if the restrictions lead to progressive disappearance of dieldrin and aldrin.

72-2519. Desaymard, P. (Author address not given). **De la maitrise des mauvaises herbes a la maitrise des herbicides. [From control of weeds to the control of herbicides.]** *Phytoma 236: 37-38; 1972.* (French)

A brief report is given on papers presented at the 6th conference of COLUMA held at Cannes on December 8-10, 1971. Topics included: surveys of common types of weeds; selectivity of herbicides and their mode of action, evolution, degradation and residues in soil and consequences for crop rotation; economic importance of weed eradication; weeding of different grain, vegetable, and grapevine crops; techniques of application.

72-2520. Anonymous. **Le DDT interdit en Suisse depuis le 1er avril 1972. [Switzerland bans DDT as of April 1, 1972.]** *Phytoma 239: 37; 1972.* (French)

A general ban on DDT and other organochlorine

pesticides such as aldrin, endrin, chlordane, perthane (1,1-dichloro-2,2-bis(4-ethylphenyl)ethane), and DDD (TDE) has been imposed in Switzerland as of April 1, 1972. DDT can be now replaced by more specific pesticides. Many of the new substitutes are more toxic, but much less stable than DDT. Since other very stable compounds such as polychlorinated biphenyls have remained in use, the problem of pesticide residues has not been solved by the ban on DDT.

72-2521. Stewart, Jr., C. A.; and Woodwell, G. M.; Craig, P. P.; Johnson, H. A. (407 Brentwood Dr., Carrcroft, Wilmington, DE 19803, and Brookhaven National Lab., Upton, NY). **Atmospheric circulation of DDT.** *Science 177(4050): 724-725; 1972.* (5 references)

In a Letter-to-the-Editor the validity of some of the assumptions which were the basis for a mathematical model describing the movement of DDT in the biosphere is questioned. Published DDT levels in air which do not support the 80 ng/m^3 used in the model are cited. It is suggested that DDT levels are really so low that the mean residence time in the atmosphere would be too short to consider world wide circulation. Also questioned was a lack of references concerning the damage done to populations by DDT. Those who designed the model explained that the the decay and transfer rates were obtained from the literature as described and that the most reasonable set of rate constants was used. The usefulness of the model in handling other data is evinced as is the fact that DDT effects were documented.

72-2522. Anonymous. **DDT, health and the 3rd world: delicate balance.** *Sci. News 102(11): 167; 1972.*

Although DDT has been banned in the U.S., developing countries will continue to use it, at least until WHO or some other agency comes up with an economical chemical that is non-toxic to humans and mammals. The U.S. Surgeon General has recommended that as long as biodegradable compounds cost much more than DDT, the U.S. should continue to provide DDT to developing countries. As more complex problems are uncovered in DDT research, particularly concerning the effects of long-term low levels, the endorsements of the compound as "safe for humans" should be re-examined.

72-2523. Simonis, W. (Botanisches Inst. I, Univ. Wuerzburg, BRD-87 Wuerzburg, Germany). **Zerstoerung des biologischen Gleichgewichts. [The upsetting of the biological equilibrium.]** *Stud. Gen. 24: 218-230; 1971.* (36 references) (German)

The dynamic equilibrium which exists between species (plant and animal) in areas ranging from a cubic centimeter of soil to the better part of a continent may be disturbed by many factors. Some of these are of natural origin, such as meteorologic upsets, but many are the result of human activities and include woodcutting, addition of minerals to waterways, and predator destruction. The use of pesticides may alter the biological balance unpredictably. Bioconcentration of the lipophilic organochlorine pesticides has resulted in appreciable accumulation of these substances in adipose tissues of birds, fish, and man. Some effects of pesticide accumulation, such as impairment of reproduction in birds, have been revealed, but additional effects may be discovered in the future; pesticides which do not degrade under natural conditions should not be used.

72-2524. Goodyear, C. P. (Ecol. Sci. Div., Oak Ridge Nat. Lab., Oak Ridge, TN 37830). **A simple technique for detecting effects of toxicants or other stresses on a predator-prey interaction.** *Trans. Amer. Fish. Soc. 101(2): 367-370; 1972.* (3 references)

A technique for detecting toxicants was based on the following premise: if a toxicant introduced into the environment causes mosquitofish (*Gambusia affinis*) to behave abnormally, predation will increase. The tank used for testing had a deep water chamber for the predatory largemouth bass (*Micropterus salmoides*), a shallow water refuge for the mosquitofish, a screen restricting the predator to deep water but allowing the mosquitofish free movement, and water depth and temperature regulators. Two controls were used: one exposed to toxicant with the predator absent; the other exposed to the predator with toxicant absent. By comparing the survival rate of fish in the test chamber with that of the two controls, it was possible to determine the predator-prey relationship resulting from the toxicant.

72-2525. Anonymous. **Modern trends in the prevention of pesticide intoxications. Report on a conference, Kiev, 1971.** *World Health Organization. Regional Office for Europe, Copenhagen, 1972, pp. 1-34. Euro 7902.* (12 references)

Conference discussions of the health hazards of pesticide use, particularly acute intoxication from occupational exposure, and recommendations to the World Health Organization are reported. In Europe recently the incidence of occupational poisoning due to pesticides appears to be declining although the information included from different participating countries cannot be compared. Adequate preliminary multidisciplinary toxicological studies in animals with all pesticides would allow for better judgment of the material and more precise definitions of uses and precautions in handling. Recommendations to WHO include: uniform collection of national morbidity and mortality statistics; initiation of long-term and epidemiological studies in man; expansion of research into protective clothing, safer equipment, and less toxic compounds; classification of pesticides according to toxicity (a proposal is included); improvement of label design; training in prevention,

diagnosis, and treatment of poisoning; and compilation of comprehensive data sheet on each chemical.

72-2526. Trakhtenberg, I. M.; Kagan, Yu. S.; Belonozhko, G. A.; Antonovich, E. A.; Pol'chenko, V. I. (All-Union Res. Inst. Hyg. Toxicol. Pestic., Polymers, and Plastics, Kiev, USSR). **Pesticides and problems of hygiene.** *Hyg. Sanit. 35(7): 14-17; 1970.* (11 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(7): 16-19; 1970, see Abstract no. 71-1345.

72-2527. Shitskova, A. P.; Elizarova, O. N.; Riazanova, R. A. (Erisman Res. Inst. of Hyg., Moscow, USSR). **The environmental cycle of pesticides and nutritional hygiene.** *Hyg. Sanit. 35(11): 7-10; 1970.* (11 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(11): 147-151; 1970, see Abstract no. 71-2635.

72-2528. Spynu, E. I.; Molozhanova, L. G; Stefanskiy, K. S. (All-Union Res. Inst. Hyg. and Toxicol. of Pesticides, Polymers and Plastics, Kiev, SSR). **On the hygienic criterion for soil pollution by pesticides.** *Hyg. Sanit. 35(11): 79-82; 1970.* (5 References)

Enlgish translation; for an abstract of the original Russian articls, *Gig. Sanit.*. 35(11): 235-238; 1970, see Abstract no. 71-2636.

72-2529. Mick, D. L.; Long, K. R.; Bonderman, D. P. (Inst. of Agr. Med., Coll. of Med., Univ. of Iowa, Iowa City, IA 52240). **Aldrin and dieldrin in the blood of pesticide formulators.** *Amer. Ind. Hyg. Ass. J. 33(2): 94-99; 1972.* (16 references)

Blood samples from 21 employees in a pesticide-formulating plant were analyzed for aldrin and dieldrin at the conclusion of formulating 2000 pounds of technical aldrin. Working conditions which allowed for increased aldrin exposure resulted in increased aldrin residues in the erythrocytes and increased dieldrin residues in the blood plasma. The latter values were about fifty times as great, but the trends were similar. The mean residue values for the aldrin formulators were 182.5 ppb dieldrin in the plasma and 3.7 ppb aldrin in the erythrocytes. Aldrin residues in the blood plasma and dieldrin residues in the erythrocytes were not indicative of degree of aldrin exposure. The blood plasma contained proportionately more aldrin and dieldrin than the erythrocytes as exposure to aldrin increased. (Author abstract by permission)

72-2530. Fournier, E.; Treich, I.; Campagne, L.; Capelle, N. (Unite de Toxicol. Experimentale U. 26, I.N.S.E.R.M., Paris, France). **Pesticides organo-chlores dans le tissu adipeux d'etres humains en France. [Organochlorine pesticide residues in human adipose tissue in France.]** *Eur. J. Toxicol. 5(1): 11-26; 1972.* (45 references) (French)

Organochlorine pesticide residues were investigated by gas chromatography in perirenal adipose tissue samples from 98 deceased Paris area residents. Lindane and α-BHC, dieldrin, TDE, DDE, *p,p'*-DDT, and heptachlor epoxide were detected. Aldrin and heptachlor were not present in the samples. Lindane, α-BHC, and TDE, found in the amounts of 0.04-0.05 ppm, 0.05-0.07 ppm, and 0.05-0.06 ppm, respectively, showed negligible variations with age. The heptachlor epoxide contents averaged 0.28-0.36 ppm, were relatively high in young persons, and later stabilized at lower values. The dieldrin residues (0.36-0.43 ppm) rose up to age 45 and also stabilized at lower values. Variations in the *p,p'*-DDT, DDE, and total DDT residue levels, which averaged 0.65-0.75 ppm, 1.87-1.97 ppm, and 3.02-3.37 ppm, showed similar trends. Two samples contained no DDE, and only traces of DDT were detected in 12 samples. Statistically significant correlations between DDT and dieldrin residues were established. The residue levels are comparable to the moderate to low levels obtained for some northern European countries. The DDT levels show a downward trend with an average of 3.27 ppm in 1971 against a value of 5.2 in 1963.

72-2531. Anonymous. **Warning against parathion residues on citrus.** *Farming S. Afr. 48(3): 11; 1972.*

An investigation of the rate of breakdown of parathion residues on different kinds of citrus in several important citrus areas in S. Africa indicated that to comply with European tolerances, no parathion should be applied later than 6-8 wk after petal fall. When sprays of 375 g/500 l. were applied, there were no significant differences in the rates of breakdown in different areas or between application with and without a light oil. However, time of application mattered, and initial deposits with oil were greater. With spring application, the time required to reach the 0.5 ppm tolerance is 38 days without oil and 54 days with oil. In summer 82 and 94 days, respectively, are required and in late summer 200 and 224 days are necessary. Similar degradation was noted on grapefruits, navels, and Valencias, but initial deposits were greater on Valencias.

72-2532. Rohrlich, M.; Suchow, P.; Hertel, W. (Bundesforschungsanstalt fuer Getreideverarbeitung, Berlin, Germany). **Untersuchungen ueber die Verteilung von Lindan (γ-1,2,3,4,5,6-Hexachlorcyclohexan) in Getreide und seinen Verarbeitungsprodukten. [Studies on the distribution of lindane (γ-1,2,3,4,5,6-hexachlorocyclohexane) in grain and its processing products.]** *Getreide Mehl 21(12): 109-114; 1971.* (5 references) (German)

A method was developed for the quantitative determination of lindane in grain and milled products. The samples were shake-extracted with *n*-hexane and the extracts cleaned up by gel chromatography on Sephadex LH 20 and liquid-liquid partition. Lindane contents were read on a gas-liquid chromatograph with electron-capture detector. The largest quantities of lindane were found in the wheat germ. The husk contained more lindane than the interior of the grain. Grits and coarse meal contained more lindane than the corresponding flour with lower ash content. The lindane content of the flour increased with rising ash content. Lindane was not removed by washing the grain, and only small amounts of lindane applied from solutions were removed by moist conditioning in a laboratory conditioner and wet hulling of the grain. However, the wet hulling of grain to which lindane was applied by fumigation resulted in removal of about half of the pesticide.

72-2533. Kozhinova, L. A.; Grigor'yeva, T. I.; Maslennikova, L. S. (Sysin Inst. Gen. and Environ. Hyg., Acad. Med. Sci., Moscow, USSR). **Hygienic evaluation of soil and plants processed with polychloropinene.** *Hyg. Sanit. 35(8): 53-56; 1970.*

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(8): 232-235; 1970, see Abstract No. 71-2109.

72-2534. Khasanov, V. K. (Khorezm Reg. Sanitary-Epidemiol. Cent., Khorezm, USSR). **Air pollution by Butiphos (DEF) in cotton defoliation.** *Hyg. Sanit. 35(9): 86-87; 1970.* (6 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(9): 451-453; 1970, see Abstract no. 71-2110.

72-2535. Spynu, E. I.; Ivanova, L. N. (All-Union Res. Inst. Hyg. and Toxicol. of Pestic., Polymers, and Plastics, Kiev, USSR). **Cybernetic approach in the hygiene and toxicology of pesticides.** *Hyg. Sanit. 35(10): 52-55; 1970.* (8 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(10): 62-66; 1970, see Abstract No. 71-2487.

72-2536. Orlovskiy, V. M.; Golovan', D. I.; Kudzina, G. D. (Marzeyev Res. Inst. Gen. Environ. Hyg., Kiev, USSR). **Hygienic aspects of the processing of irrigation canals with new organochlorine herbicides.** *Hyg. Sanit. 35(11): 91-92; 1970.*

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(11): 251-252; 1970, see Abstract no. 71-2701.

72-2537. Mandroiu, V.; Iordachescu, M. (Inspectoratul Sanitar de Stat, Judetul Vrancea, Rumania). **Contributii la stabilirea gradului de impregnare cu hexaclorciclohexan a organismului uman. [Determination of the BHC content in the human organism.]** *Igiena 20(6): 363-364; 1971.* (4 references) (Rumanian)

BHC amounts ranging from 0.08-42 ppm were found in 20 of 45 bioptic fatty tissue samples collected during surgery on patients of the Vrancea region. Of the BHC-positive samples, 62.2% were from women from 21-40 yr old; 75% were rural dwellers. Twenty percent of the BHC-positive samples were found in high school students below 18 yr old, most of whom lived in rural areas. Fifteen of the 70 mother's milk samples analyzed had BHC ranging from 0.08-0.56 ppm. The majority (53.3%) of the BHC-positive milk samples were from urban areas and found in women who had never been occupationally exposed to BHC.

72-2538. Bhalla, J. S.; Krueger, H. R.; Bindra, O. S.; Deshmukh, S. N. (Dept. of Zool.-Entomol., Punjab Agr. Univ., Ludhiana, India). **Estimation of endrin residues in/on *bhindi* fruits by gas-chromatography.** *Indian J. Entomol. 32(3): 189-193; 1970.* (9 references)

Endrin residue determinations by GLC using an electron capture detector indicated that the pesticide did not disappear completely from *bhindi*. Ten days after the second application, 0.07 ppm was found, and 0.03 ppm remained 25 days after the third spray. Endrin levels decreased 91 to 93% in the first 7 days. The half-life values were 1.81 days in August and 2.30 days in September. Endrin residues on *bhindi* from the market ranged from 0.05-0.3 ppm. Washing, rubbing, and cooking the fruits reduced the levels up to 60%, but did not eliminate them.

72-2539. Deshmukh, S. N.; Lal, R. (Div. of Entomol., Indian Agr. Res. Inst., New Delhi 12, India). **Dissipation of carbaryl residues from brinjal (*Solanum melogena* L.) plants.** *Indian J. Entomol. 32(3): 201-204; 1970.* (10 references)

The half-life of carbaryl, following application of a 0.15% suspension on leaves, stem, and fruit of brinjal plants of two different ages, was 6.57 and 6.64, 6.005 and 6.19, and 6.39 and 6.44, respectively. A fairly constant rate of disappearance was observed, and values obtained by bioassay were in agreement with those obtained by chemical assay. Initial deposits were 51.28 and 52.07 ppm on leaves, 35.52 and 36.69 ppm on stem, and 40.83 and 39.59 ppm on fruit. After 20 days the residues were 5.64 and 6.50 ppm, 4.10 and 5.26 ppm, and 6.10 and 5.83 ppm. Within 12 to 13 days the U.S. FDA tolerance level of 10 ppm would be achieved following a 0.15% application.

72-2540. Dorough, H. W.; Pass, B. C. (Dept. of Entomol., Univ. of Kentucky, Lexington, KY 40506). **Residues on corn and soils treated with technical chlordane and high-purity chlordane (HCS 3260).** *J. Econ. Entomol. 65(4): 976-979; 1972.* (3 references)

Mature corn grain and cobs grown in soils treated at planting with 1 and 2 lb active ingredient per acre of technical chlordane or HCS 3260 (high purity chlordane) were free of detectable insecticide residues (limit of sensitivity = 0.008 ppm). The stalk contained trace quantities of α- and/or γ-chlordane. Whole corn plants harvested as for silage, 102 days after planting, contained about 0.03-0.04 ppm combined α- and γ-chlordane, while heptachlor and heptachlor epoxide were not detected. Maximum ppm total residues in the upper 4 inches of soil were approximately twice the treatment rate in pounds with technical chlordane and 3-4 times the treatment rate of HCS 3260. Fifty to 70% of these residues had dissipated after one year. (Author abstract by permission)

72-2541. Chisholm, D.; MacPhee, A. W. (Canada Dept. of Agr., Res. Sta., Kentville, NS, Canada). **Persistence and effects of some pesticides in soil.** *J. Econ. Entomol. 65(4): 1010-1013; 1972.* (14 references)

Long-term persistence and effects of DDT, arsenic, BHC, chlordane, sulfur, ferbam, and parathion, applied to a sandy loam in 1949-1953, were investigated in a field experiment at Kentville, Nova Scotia, during the period 1959-69. Applications of DDT significantly decreased yield of beans 16 years after application. More than 50% of applied DDT and arsenic remained in the soil for 15 and 16 years, respectively. Traces of par-

athion were detected in 1969. Plant nitrogen content was affected by both arsenic and DDT treatments, and DDT residues influenced soil fauna. (Author abstract by permission)

72-2542. Burrage, R. H.; Saha, J. G. (Canada Agr. Res. Sta., Univ. Campus, Saskatoon, Sask., Canada). **Insecticide residues in pheasants after being fed on wheat seed treated with heptachlor and ^{14}C-lindane.** *J. Econ. Entomol. 65(4): 1013-1017; 1972.* (12 references)

Different amounts of heptachlor-treated wheat seed containing 365 ppm heptachlor and 105 ppm *trans*-chlordane were fed to pheasants for different lengths of time, and residues in muscle, liver, brain, and fatty tissues were determined at various times later. In general, residues of heptachlor epoxide (HE) in body tissues were related to the number of treated seed fed and the length of feeding time. Pheasants that were fed only 5 treated seed/day for 15 days had 0.17-0.23 ppm and 1.16-1.60 ppm HE in liver and fat, respectively, 14 days later. Feeding of 10 or 20 seed/day for 15 days resulted in higher levels of residues in all tissues. Consumption of only 5 or 20 treated seed by the pheasants in 1 day resulted in only 0.02 to 0.06 ppm HE in liver even after 14 days. Pheasants that were fed as many treated seed as they would eat (700-1240 seed or 9.9-17.5 mg of toxicant) in 1 day had very high levels (up to 32.5 ppm in fat) of residues 1 day later. Although residue levels of all tissues decreased with time, about 1.0 ppm and up to 0.07 ppm HE was present in fat and muscle, respectively, even after 90 days. Pheasants that were fed as many ^{14}C-lindane-treated seed as they would eat (525-860 seed or 9-14.8 mg of toxicant) in 1 day had up to 1.12 and 2.48 ppm residue in muscle and liver, respectively, 1 day later. But these levels decreased very rapidly, and no residue could be detected even after 14 days. It is suggested that lindane seed dressings are less hazardous to seed-eating birds than heptachlor seed dressings and that the use of heptachlor should be discontinued. (Author abstract by permission)

72-2543. Vasil'yev, V. P.; Degtyareva, A. S.; Kosmatyy, Ye. S.; Gavrilova, G. V. (Ukrainian Sci. Res. Inst. of Plant Protection, USSR). **Ob ostatkakh DDT v tkanyakh razlichnykh chastey dereva i plodakh yabloni. [DDT residues in various parts of apple trees and in the fruit.]** *Khim. Sel. Khoz. 9(5): 344-345; 1971.* (3 references) (Russian)

Residues of DDT were investigated in various parts and the fruit of dwarf apple trees. For two consecutive years the trees had been sprayed with 0.7% DDT-suspension, or DDT had been introduced into the soil at the rate of 60 g/m^2 · year. No noteworthy decrease in the soil DDT levels, which ranged from 2.25 to 6.0 mg/kg, was observed even after three years. Uptake and accumulation of DDT in various parts of the trees were determined: 0.7-2.3 mg/kg in roots, 1.1-1.25 mg/kg in twigs, 0.8 mg/kg in wood, 1.0-3.3 mg/kg in bark, and 0.04-4.0 mg/kg in leaves. Woody tissues of sprayed trees contained no DDT, and the rate of accumulation was independent of the mode of application. No traces of DDT were detected in apples grown in the following year when DDT was not applied. The translocation of DDT is probably accomplished solely by the transpiration system.

72-2544. Patrashku, F. I. (All-Union Res. Inst. for Biol. Methods of Plant Protection, Moldavian SSR, USSR). **Dinamica ostatkov metilnitrofosa, metationa i sumitiona na list'yakh, vetkakh i plodakh yabloni v suloviyakh Moldavii. [The dynamics of methylnitrofos, Metathion, and Sumithion residues on leaves, branches, and apple fruits under conditions specific for Moldavia.]** *Khim. Sel. Khoz. 9(11): 835-837; 1971.* (10 references) (Russian)

The residue dynamics of three different preparations of fenitrothion, methylnitrophos (USSR), Metathion (Germany), and Sumithion (Japan), were studied in leaves, branches, fruits, and surface soil of apple orchards after spraying. Leaf samples with a surface of 2000 cm^2 indicated that most of the residues from 0.3% solutions disappear within three days of application. Of the three compounds, methylnitrophos decreased the most to 1.3 mg/cm^2 14 days after treatment; Sumithion had the most persistent action according to other recorded data. However, on the branch samples, methylnitrophos residues lasted longer, depending on the roughness of the branch surface. In the fruit samples, methylnitrophos had the lowest residues, 0.3-0.7 mg/kg, compared to 0.5-2.0 mg/kg of Metathion, and 0.6-6.0 mg/kg of Sumithion, when applied in 0.15 and 0.25% concentrations. However, in the soil residue results, Metathion, determined in 0-5 cm layers, disappeared totally 6-7 days after spraying.

72-2545. Khubutiya, R. A.; Gigineyshvili, A. A. (Sci. Res. Inst. of Plant Protection, Tiflis, USSR). **Opredeleniye ostatochnykh kolichestv pochvennykh gerbitsidov v pochve i tsitrusov. [Determination of residual amounts of soil herbicides in soil and citrus fruit.]** *Khim. Sel. Khoz. 9(12): 924-928; 1971.* (8 references) (Russian)

Spectrophotometric and thin-layer chromatographic methods were used for the quantitative determination of monuron, diuron, simazine, and atrazine in various soils and in tangerines, oranges, and lemons. Carbamate derivatives, especially monuron, were most effective on red soil and were easily washed away from the upper layers of alluvial-sandy soil. Diuron and monuron residues remained longer in brown forest soil. Under subtropical conditions, almost all the preparations penetrated all layers of the soil profile (0-40 cm) during two months. At the end of the vegetation period in brown forest soil, herbicide residues were found only in areas treated with high doses. Accumulation did not

occur with the use of 10 kg/ha of monuron for a few successive years. The accumulation in leaves was greater with higher doses of diuron than with monuron, even though the latter was very phytotoxic. The herbicides were found in the leaves two months after treatment, and after that their quantity varied insignificantly. Traces of atrazine, diuron, and monuron were found only in the skin of unripened fruit with the use of 13.5-16 kg/ha. No herbicides were found in ripe fruit.

72-2546. Gar, K. A.; Alekseyeva, Ye. M. (All-Union Res. Inst. of Plant Protection Chem., USSR). **Ostatki geksakhlorbutadiyena v vinograde i produktakh yego pererabotki. [Hexachlorobutadiene residues in grapes and grape products.]** *Khim. Sel. Khoz. 10(1): 25-27; 1972.* (2 references) (Russian)

Residues of hexachlorobutadiene were determined in grapes, wine, grape juice, and pomace. Wine samples made from grapes treated with hexachlorobutadiene at rates of 250-500 kg/ha contained residues in concentrations of 0.16 μg/l. The residue concentration in the same wine sample after cooling for three months was reduced to one tenth of the original value. Grape juice samples contained hexachlorobutadiene in concentrations of 0.1-0.3 μg/l, while the concentrations in grapes ranged from 0.1-4 μg/l. Traces of hexachlorobutadiene in wine and grape samples obtained from vine-stocks near treated patches indicate absorption from deep layers of the soil. The maximum allowable hexachlorobutadiene residue in grapes and wine is 10 μg/kg.

72-2547. Khaitov, R. Kh.; Baymuradov, T. B. (Uzbek Sci. Res. Inst. of Vet. Sci., USSR). **Toksikologicheskoye issledovaniye ostatkov butifosa. [Toxicological investigation of Butyphos residues.]** *Khim. Sel. Khoz. 10(1): 37-38; 1972.* (1 reference) (Russian)

Analyses of butyphos (DEF) residues in leaves, sprouts, and bolls of cotton plants and toxicological investigations of butyphos in sheep are described. The butyphos residues, reaching values up to 7-9 mg/kg during the first days after dusting at the rate of 1.5 kg/ha, decreased to 3-4 mg/kg on the fifth day, and further to 1-2 mg/kg by the eighth day. Mere traces of butyphos were detected 10-12 days after dusting. No residues were found in cotton-seeds. Alfalfa samples taken from an adjacent field contained 1-5 mg of butyphos per kg during the first ten days. Sheep fed 2 or 3 mg of butyphos per kg feed for eight months showed neither clinical symptoms of poisoning nor hematological alterations. Reduction of the blood cholinesterase activity by 20-30% was observed after six months in another group fed 4 mg/kg-doses of butyphos. Histological investigations of this group revealed neither pathological alterations of internal organs nor butyphos residues. The meat of such sheep was of standard quality.

72-2548. Adamczyk, E. (Wydzial Weterynarii WSR, Wroclaw, Poland). **Tolerancja DDT w niektorych surowcach spozywczych zwierzecego pochodzenia. [DDT tolerance in some raw foods of animal origin.]** *Med. Wet. 27(11): 690-692; 1971.* (5 references) (Polish)

The DDT + DDE content in fat, muscles, and liver of cattle, swine, lambs, and horses (groups of 30) was determined using a colorimetric method. In none of the meat and liver samples did the content exceed 1 ppm. In fat values higher than 7 ppm were found in 40% of beef, 56.7% of pork, 13.4% of horse, and 0% of lamb. The lowest levels were detected in lamb (1 ppm in 70% of animals) and horses (46.6%). It is suggested that the high level of insecticide residue in pork and beef is due to the massive use of DDT to fight the potato beetle. It is concluded that the recommended tolerance limit of 1 ppm can be achieved in meat and liver, but not in fat.

72-2549. Miryakubova, D. A. (Uzbekistan Inst. of Sanit. and Hyg., Tashkent, USSR). **Gigiyenicheskaya kharakteristika zagryazneniya atmosfernogo vozdukha geksakhloranom pri obrabotke khlopchatnika. [Hygienic assessment of air pollution during dusting of cotton fields with hexachlorane.]** *Med. Zh. Uzb. 12: 40-41; 1971.* (Russian)

Hexachlorane (BHC) concentrations in the air were measured on the leeward side for six days after the dusting of a four-ha cotton field (at a rate of 10-12 kg/ha). Samples were taken three times (8-10 A.M., 12 A.M.-4 P.M. and 8-10 P.M.) at a rate of 1 liter/min. Temperatures of 25-30°C and wind speeds of 6-8 m/sec were recorded. The average concentration over five days at a 50 m distance was 0.480 mg/m^3 ranging from 0.015 to 1.350 mg/m^3. The average obtained for a distance of 100 m over five days was 0.29 mg/m^3, with a maximum and minimum of 0.01 and 0.95 mg/m^3. Hexachlorane at 300 m distance in a concentration of 0.088 mg/m^3 was detected only the first two days after dusting. It was not possible to detect hexachlorane at distances of 700 and 1,000 m. A close relationship between the concentrations/distance and time was determined, the correlation coefficients being 0.97 and 0.90, respectively. Secondary air pollution was due to evaporation, as indicated by a correlation coefficient of 0.97 for the relationship between concentration and temperature. The percentages of population perceiving the odor of hexachlorane at 50 and 500 m distances of the cotton field were 81% and 16.1% while the odor was imperceptible at 1,000 m distance. The percentages of population at 50 and 700 m affected by indisposition, headache, asthenia universalis, and vomiting were 66.6% and 2%, respectively. The results indicate the need for a protection zone about 500 m wide.

72-2550. Khan, I. A.; Rashid, S.; Naqvi, S. N. H. (PCSIR Lab., Karachi 39, Pakistan). **The persistance of**

Petkolin residues measured by biological method. *Pak. J. Sci. Ind. Res. 14(6): 523-525; 1971.* (11 references)

The disappearance of Petkolin (petroleum based insecticide) from cotton leaves was followed by determining the toxicity of leaf extracts to the 4th instar larvae of *Aedes aegypti* and comparing the results to a standard curve. The percentages of Petkolin remaining on leaves sprayed with 1, 1.5, 2, and 3% emulsions were 7.5, 8.2, 10.4, and 11.0, respectively, at 24 hr; 4.4, 4.8, 5.3, and 6.8, at 72 hr; and 2.0, 2.4, 2.9, and 3.3 at 1 wk. Results are in agreement with published data on Petkolin residues determined by spectrophotometry.

72-2551. Liu, S.-Y.; Bollag, J.-M. (Lab. of Soil Microbiol., Dept. of Agron., Penna. State Univ., University Park, PA 16802). **Carbaryl decomposition to 1-naphthyl carbamate by *Aspergillus terrus*.** *Pestic. Biochem. Physiol. 1(3-4): 366-372; 1972.* (10 references)

The metabolism of carbaryl by the soil fungus *Aspergillus terrus* was investigated. Of the four degradation products isolated, two were found only in minute amounts and were tentatively identified as 4-hydroxy- and 5-hydroxy-1-naphthyl methyl carbamate. The two predominant metabolites, each accounting for about 20% of the added radioactive label, were identified as 1-naphthyl *N*-hydroxymethyl carbamate and 1-naphthyl carbamate. The metabolites began to appear at 2 days and peak accumulations were observed at 6 days. Each compound was decomposed to 1-naphthol, but it was not determined whether chemical or biological degradation was responsible. *A. terrus* further metabolized 1-naphthol.

72-2552. Jhooty, J. S.; Singh, H. (Dept. of Chem. and Biochem., Punjab Agr. Univ., Ludhiana, India). **Stability of benomyl in plants.** *Phytochemistry 11(7): 2207-2208; 1972.* (4 references)

TLC analysis of extracts of mung seedlings exposed to benomyl in the soil revealed the presence of the original compound and benzimidazole carbamic acid methyl ester (BCM). Apparently, benomyl does not hydrolyze as rapidly as was thought. Complete hydrolysis of the benomyl was achieved by heating it in methanolic HCl to 50° or 60° for 1 hr.

72-2553. De Borger, R. (Inst. de Recherches Chimiques, Tervuren, Belgium). **L'adsorption de molecules non ionisees d'herbicides par la matiere organique du sol. [Adsorption of non-ionized herbicide molecules by organic matter in soil.]** *Rev. Agr. Brussels 25(2): 201-208; 1972.* (18 references) (French)

Different views on the mechanism of adsorption of non-ionized herbicides such as triazines and urea derivatives are briefly reviewed. It is suggested that: formation of salts between herbicides and humus components is minimal and negligible under normal soil conditions; formation of complexes between herbicides and organic matter is possible; hydrogen bonds are formed during adsorption, but not on a large scale because of competition with molecules of water; adsorption is probably non-specific, occurs at the non-polar points of organic matter, and is decisively influenced by the ratio of hydrophilic to hydrophobic properties of the herbicide residues. It is emphasized that the organic matter content of soil decisively influences herbicide residues. These are also affected by the action of the soil's microflora which, in turn, is related to the composition and properties of organic matter.

72-2554. Anderson, J. R.; Horsgood, R. K. (Imperial Chem. Ind., Plant Protection Ltd., Jealott's Hill Res. Station, Bracknell, Berks, England). **Studies on the degradation of an isoxazolone fungicide by pure cultures of soil bacteria.** *Soil Biol. & Biochem. 3(4): 271-280; 1971.* (7 references)

Between 10% and 100% degradation of drazoxolon was effected by 70 bacterial isolates from soil enrichment cultures. The two isolates having the greatest activity were identified as an *Aerobacter cloacae*-like organism and a non-fluorescent *Pseudomonas* sp. Metabolism by both organisms was most rapid at a slightly alkaline pH, yielded 2-(2-chlorophenylhydrazono)-acetoacetic acid (metabolite I) and *o*-chloroaniline, and provided the sole source of nitrogen. Glucose appeared to have a repressing effect on the metabolite I–*o*-chloroaniline pathway in the *Aerobacter*. Metabolite I at 4.2×10^{-4} M was toxic in both bacteria. Formulation additives did not interfere with decomposition of drazoxolon.

72-2555. Bordeleau, L. M.; Bartha, R. (Dept. of Biochem. and Microbiol., Rutgers Univ., New Brunswick, NJ 08903). **Ecology of an herbicide transformation: synergism of two soil fungi.** *Soil Biol. & Biochem. 3(4): 281-284; 1971.* (9 references)

Results of experiments in nutrient solution and in sterilized soil indicate that *Penicillium piscarium* and *Geotrichum candidum* act synergistically to degrade propanil (*N*-(3,4-dichlorophenyl)-propionamide) to 3,3',4,4'-tetrachloroazobenzene (TCAB) and other complex residues. *G. candidum* was unable to metabolize propanil, but transformed 3,4-dichloroaniline (DCA) to TCAB, while *P. piscarium* metabolized propanil to DCA, but could not convert this product to TCAB. With a mixed culture, over 80% of the propanil was metabolized in 24 days. Mycelial growth was limited in all cases, but since end products were less inhibitory than

propanil or DCA, mixed cultures showed an increase in mycelial growth. Similar findings have been published for natural soil, suggesting that the two organisms chosen are representative of a soil situation.

72-2556. Bollag, J.-M.; Liu, S.-Y. (Lab. of Soil Microbiol., Dept. of Agron., Penna. State Univ., Univ. Park, PA 16802). **Degradation of Sevin by soil microorganisms.** *Soil Biol. & Biochem. 3(4): 337-345; 1971.* (9 references)

Three Sevin (carbaryl) metabolizing microorganisms were isolated from soil by enrichment culture techniques. *Fusarium solani* and a combination of all three cultures were the most effective in decomposing the herbicide as shown by colorimetric techniques and by disappearance of ^{14}C-methyl-Sevin. In 12 days radioactivity decreased by 82% with *F. solani*. Strain C, a Gram-negative coccus, degraded approximately 51% in 7 days, with little change at 12 days. Strain R, a Gram-positive rod, was the least effective in degrading the compound. All three converted Sevin to 1-naphthol, which seemed to have a larger deleterious effect on the organisms than Sevin itself, but further breakdown products were different for each microorganism. Strain C was found to be the most active in decomposing 1-naphthol.

72-2557. Moyer, J. R.; Hance, R. J.; McKone, C. E. (Agr. Res. Counc. Weed Res. Organ., Begbroke Hill, Yarnton, Oxford OX5 1PF, England). **The effect of adsorbents on the rate of degradation of herbicides incubated with soil.** *Soil Biol. & Biochem. 4(3): 307-311; 1972.* (24 references)

Atrazine, chlorthiamid, and linuron were incubated at 20° with soil and soil containing added charcoal or clay to study the effects of adsorption on the stability of herbicides. The presence of 10% added clay increased the half-life of atrazine by about 38%, that of linuron about 18%, and that of chlorthiamid/dichlobenil only 7.5%. The soil-clay mixture reduced the concentrations of atrazine and chlorthiamid in solution, increasing availability, but apparently reduced the effectiveness of the microflora at the same time. Charcoal (2.5%) reduced the breakdown of atrazine and chlorthiamid/dichlobenil several fold, but did not affect the rate of linuron loss. Since charcoal produced a greater reduction in the herbicide concentration in soil solutions than in the herbicide decomposition rate, it could be useful as a protectant in the field.

72-2558. Laplanche, A.; Martin, G.; Richard, Y. (Lab. de Chimie des Eaux, Ecole Nationale Superieure de Chimie de Rennes, France). **Contribution a l'etude de la degradation par l'ozone de quelques insecticides du groupe des organo-phosphores. [Studying ozone-produced degradation of some organophosphate insecticides.]** *Tech. Sci. Munic. 67(6): 271-273; 1972.* (14 references) (French)

Pollution caused by organophosphate insecticides can be degraded by ozone under the conditions described. Aqueous solutions containing approximately 0.1 mg/l. of active matter of malathion, parathion, methyl parathion, fenitrothion, and ronnel were treated with an air flow containing 1.0 to 5.0 mg O_3/l. for 1 min 12 sec to 6 min. The treated solutions were extracted with an ethyl ether-petroleum ether (1:1 v/v) mixture for 12 hr after ozonization and subjected to gas chromatography. Designing of a pilot ozonizing tower would provide the means of extrapolation for industrial-pesticide-manufacturing-pollution control.

72-2559. McLennan, D. J.; Wong, R. J. (Dept. of Chem., Univ. of Auckland, Auckland, New Zealand). **Rate-acidity correlation for the base-promoted dehydrochlorination of DDT in methanol. Evidence for E1cB elimination.** *Tetrahedron (Lett.) 28: 2891-2894; 1972.* (15 references)

Recently published work by Streitweiser has shown that a Bronsted-type correlation exists between log $kT2$, the rate constants for second-order detritiation of tritiated indene and fluorene-type hydrocarbons in MeO^-/MeOH at 45°, and the hydrocarbon pKa values relative to cesium cyclohexylamide in cyclohexylamine. To support a previously proposed mechanism of the dehydrochlorination of DDT via the "irreversible" carbanion or E1cB mechanism, these values pertaining to DDT were calculated, and were shown to lie on the Streitweiser Bronsted plot. There was some discrepancy between isotope effects and the Bronsted β value for the DDT/p-$RC_6H_4O^-$ reaction series, but these have been noted in other cases. It was concluded that β is the less reliable criterion of transition state structure.

72-2560. Bjerk, J. E. (Inst. for Farmakol. og Toksikol., Norges Veterinaerhogskole, Oslo, Norway). **Rester av DDT og polyklorerte bifenyler i norsk humant materiele. [DDT and polychlorinated biphenyl residues in human material in Norway.]** *Tidsskr. Norske Laegeforen. 92: 15-19; 1972.* (31 references) (Norwegian)

Residues of DDT and polychlorinated biphenyls (PCBs) were determined in human perirenal adipose tissues, brain tissues, and mother's milk samples. The DDT residues in 40 adipose tissues taken from deceased Oslo area residents ranged from 0.10-13.5 ppm with an average of 2.67 ppm, or 4.67 ppm on a fat basis. The average PCB content in the above samples was 0.9 ppm, or 1.6 ppm on a fat basis. The DDT content in tissues taken from sixteen deceased rural residents was 4.49 ppm, or

5.34 ppm on a fat basis, while the averages of the DDT and PCB contents in 56 samples were 3.2 ppm and 0.8 ppm, or 4.9 ppm and 1.4 ppm on the fat basis. Brain tissues contained an average of 0.025 ppm DDE with all values below 0.1 ppm. No correlation was found between the amounts of fat and DDT, or age and DDE levels in the brain; the DDT and PCB contents in adipose tissues were significantly correlated with each other. The DDT and PCB residue levels in 42 mother's milk samples were 0.05-0.1 ppm and 0.01 ppm, respectively.

72-2561. Grimm, L.; Hoppe, P. (Inst. fuer Tierphysiol. der Univ. Muenchen, Munich, Germany). **Pestizid-Rueckstaende (chlorierte Kohlenwasserstoffe) in der Leber von Auerhahn (*Tetrao urogallus*) und Birkhahn (*Lyrurus tetrix*). [Pesticide residues (chlorinated hydrocarbons) in the liver of capercaillie (*Tetrao urogallus*) and blackgame (*Lyrurus tetrix*).]** *Tieraerztl. Umsch. 27(8): 391-395; 1972.* (10 references) (German)

Livers of 33 capercaillie and 27 blackgame provided by taxidermists were extracted exhaustively with petroleum ether. The birds had been shot in remote areas of southern Germany. After evaporation of the solvent, the organochlorine compounds were separated from the lipids by alumina column chromatography and the eluate analyzed by gas chromatography. Average pesticide contents in capercaillie liver fat were 1.44 ppm HCB, 0.46 ppm lindane, 0.76 ppm BHC isomers, 0.14 ppm heptachlor, 0.44 ppm aldrin, no α-endosulfan, 2.61 ppm p,p'-DDE, 0.97 ppm dieldrin, 1.83 ppm TDE, 1.83 ppm p,p'-DDT, and 2.06 ppm endrin. Liver fat from blackgame averaged 0.86 ppm HCB, 0.06 ppm lindane, 0.08 ppm BHC isomers, 0.21 ppm heptachlor, 0.42 ppm aldrin, no α-endosulfan, 1.36 ppm p,p'-DDE, 0.76 ppm dieldrin, 0.61 ppm p,p'-TDE, 0.74 ppm p,p'-DDT, and 0.68 ppm endrin. Since capercaillie are forest-dwellers and presumably would not have the opportunity to eat HCB-dressed grain, the source of the HCB is unknown.

72-2562. Gontovaya, N. A.; Shtenberg, A. I. (Republican Sanitary and Epidemiol. Sta. of the Moldavian SSR Min. of Pub. Health, Kishinev, USSR). **Ostatochnoye soderzhaniye nekotorykh pestitsidov v sutochnykh pishchevykh ratsionakh zhiteley dvukh sel'skikh mikrorayonov moldavskoy SSR. [Residual amounts of some pesticides occurring in the daily food rations of two rural microdistrict dwellers in the Moldavian SSR.]** *Vop. Pitan. 30(6): 28-32; 1971.* (16 references) (Russian)

According to analytical data obtained between 1967 and 1969 from analyses performed on 27 food products, residual DDT, BHC, carbaryl, and trichlorfon constituted 0.04, 0.32, 0.01, and 0.1 mg, respectively, in the daily food ration. Residents of this rural district use an estimated annual 207 to 218 tons of pesticides. Residues were estimated to be half as high in the daily food rations of dwellers of another district with a 39.1-58.6 ton annual pesticide consumption. Close coincidence with these figures was ascertained upon TLC of organized and domestic food preparations for DDT and BHC. Both compounds were found below the maximum allowable concentration limit. DDE was found to occur as a metabolite of DDT in 0.055 mg and 0.027 mg amounts, respectively, in the high and low pesticide consumption districts.

72-2563. Uhnak, J. (Author address not given). **DDT a ine chlorovane insekticidy v mlieku. [DDT and other chlorinated insecticides in milk.]** *Vyziva Zdravie 16(1): 21-22; 1971.* (Slovak)

Chlorinated insecticides used in Slovakia under various trade names contain DDT, lindane, and methoxychlor as active substances which enter milk through contaminated feeds, the spraying of cows, and contamination of milk cans in dairies. In 1965, 0.1-0.8 mg/kg chlorinated hydrocarbons were detected in butter fat in Slovakia by paper chromatography (as against 0.1-0.25 mg/kg in England, 0.0-0.1 mg/kg in Denmark). Since then their content in butter fat has decreased in many European countries and in 1967 was 0.05 mg/kg in England, 0.04 mg/kg in Denmark, and 0.04 mg/kg in East Germany. In Slovakia this decrease did not occur. Gas chromatographic tests performed on butter from the Bratislava dairy between April 1968 and April 1969 revealed an average of 0.8 mg/kg BHC and 0.4 mg/kg DDT; similar results were reported from other regions of Slovakia. Even though residues of chlorinated hydrocarbons in milk in Slovakia do not exceed current U.S. maximal permissible levels, it will be necessary to gradually limit and ultimately prohibit the use of chlorinated hydrocarbons because of their threat to human health.

72-2564. Hurle, K. B.; Freed, V. H. (Dept. of Agr. Chem., Oregon State Univ., Corvallis, OR 97331). **Effect of electrolytes on the solubility of some 1,3,5-triazines and substituted ureas and their adsorption on soil.** *Weed Res. 12(1): 1-10; 1972.* (19 references)

The solubilities of three isopropylamino, ethylamino-triazines (chloro-, methoxy-, and methylthio-) and three *N'*-phenyl-*N,N*-dimethylureas (0, 1, and 2 chlorine substitutions on the phenyl group) were determined in water and in solutions of chloride salts of NH_4^+, K^+, and Ca^{++} at ionic strengths of 0.3 and 0.6. Adsorption of these compounds by soil from the same chloride solutions at ionic strengths of 0.3 was measured. As expected, the solubilities were depressed by increasing ionic strength, but the type of cation exerted a small, though significant, effect. Adsorption of the test compounds increased in the presence of the

various salts. The possible import of these findings in relation to joint fertilizer and herbicide use and soil drying following herbicide application is commented on. (Author abstract by permission)

72-2565. Eastin, E. F. (Dept. of Soil and Crop Sci., Texas A & M Univ., College Station, TX 77843). **Photolysis of fluorodifen.** *Weed Res. 12(1): 75-79; 1972.* (3 references)

A dry film of *p*-nitrophenyl-*a*,*a*,*a*-trifluoro-2-nitro-*p*-tolyl ether (fluorodifen) decomposed rapidly under ultraviolet (253.7 nm) irradiation in the laboratory. Photolysis under growth chamber lights was slower. One major photolysis product (probably a polymer of fluorodifen) and several minor products were detected. (Author abstract by permission)

See also 72-2498 72-2504 72-2570 72-2580 72-2704
72-2502 72-2528 72-2572 72-2586 72-2720

72-2566. Motin, J.; Maret; Traeger;* Fries; Guibaud (Hopital de l'Antiquaille, Lyon, France). **Une tentative de suicide par le chlorate de soude. [Attempted suicide with sodium chlorate.]** *Bull. Med. Leg. Toxicol. Med. 13: 177-179; 1970.* (French)

The symptoms and attempted treatment of a fatal case of sodium chlorate poisoning (amount ingested not specified) in a 44-year-old woman are described in detail. Six hours after herbicide ingestion, the patient became cyanotic and lapsed into coma several hours later. Methemoglobinemia, cerebral damage, and myocardial ischemia developed within the next several days. The patient died seven days after poison ingestion despite intensive therapy (oxygen, exchange transfusion, dialysis). It is concluded that this patient died not because of methemoglobinemia, but because of multiple secondary lesions due to ischemia; e.g., cerebral ischemia (expressed by coma which surprisingly improved after two days), cardiac ischemia (evidenced by the ECG on the 7th day), and renal ischemia (expressed by anuria). The outcome might have been different had not 10 hours elapsed before exchange transfusion was instituted.

72-2567. Anonymous. **Household insecticides.** *Consum. Rep. 37(8): 522-527; 1972.*

A guide is presented for selecting the least hazardous product for disposing of household pests. Most space sprays for the extermination of flying insects are considered low or moderate in toxicity when certain precautions are taken. Standard precautions include avoiding food contamination and exposure to an open flame. For serious infestation by stinging insects, a professional exterminator is recommended. Preventive measures are described: organic refuse should be removed and garbage cans tightly closed; stagnant water should be covered; screening should fit tightly into window and door frames. An insecticide listing classifies the products under the headings of slightly hazardous, moderately hazardous, and too hazardous for household use; the latter category includes vaporizing strips and fumigating smoke. Crawling insects are more difficult to exterminate. The insecticides come in various forms (powders, sprays, poison baits), and special precautions are recommended in homes with children. Preventive measures are related to proper garbage disposal and avoidance of infestation of household pets. If an insecticide must be used, ways of reducing the risks are described. Existing federal legislation governing the labeling and sale of pesticides is criticized as inadequate.

72-2568. Hsieh, D. P.; Archer, T. E.; Munnecke, D. M.; McGowan, F. E. (Dept. of Environ. Toxicol., Univ. of California, Davis, CA 95616). **Decontamination of noncombustible agricultural pesticide containers by removal of emulsifiable parathion.** *Environ. Sci. Technol. 6(9): 826-829; 1972.* (8 references)

Large quantities of noncombustible containers have resulted from years of widespread use of agricultural pesticides, an ingredient of which has been parathion in an emulsifiable form. The used containers all show residues, in significant amounts, of the original solution. The formulation can be effectively removed from the containers by repeated rinsings with small volumes of water or alkaline detergent solution. The parathion in the resulting wash liquids undergoes slow degradation and its toxicity persists for months. Ethanol, however, strongly enhances the rate of hydrolysis of parathion in alkaline solutions. (Author abstract reprinted by permission of the American Chemical Society)

72-2569. Ginies, G.; Gautier, J.; Lamisse, F. (Author address not given). **Les complications pulmonaires secondaires dans les intoxications par les organophosphores. A propos de deux observations. [Secondary pulmonary complications in poisoning with organophosphorus compounds. Two cases.]** *Eur. J. Toxicol. 5(1): 114-116; 1972.* (French)

Secondary pulmonary complications in poisoning with organophosphorus compounds are illustrated by two cases of intentional parathion poisoning. Visual disturbances, increased thoracic pressure, deep coma, hypersalivation, miosis, rapid and shallow respiration, and severe, mixed acidosis with hypoxia were the symptoms observed in one case. Atropine plus pralidoxime therapy was helpful. Another patient showed rapid improvement after coma, miosis, muscular fibrillations, bronchial and pulmonary obstruction. Pulmonary edema with anuria, appearing some 50 hours after poisoning, caused death. The cholinesterase inhibition due to poisoning with organophosphorus compounds produces three different syndromes. The muscarinic syndrome includes miosis, vision troubles, bradycardia, hypotension, hypersecretion, and bronchial constriction with dyspnea. Muscular fibrillations, possible paresthesia, and paralysis, particularly of the respiratory, striated muscles comprise the nicotinic or neuromuscular syndrome, which is accompanied by a third, CNS syndrome. Since pulmonary edemas in poisonings with organophosphorus compounds may be delayed, prolonged observation of pulmonary function is necessary.

72-2570. Derevyanko, L. D.; Klimenko, A. A. (All-Union Res. Inst. Agr. and Special Uses of Aviation, Krasnodar, USSR). **Hygienic evaluation of working conditions during methyl mercaptophos spraying from aircraft.** *Hyg. Sanit. 35(7): 101-102; 1970.* (5 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(7): 129-131; 1970, see Abstract no. 71-1389.

72-2571. Sundwall, A. (Farmakologiska Inst., Umea Univ., Umea, Sweden). **Behandling av akuta intoxikationer (4): Behandling med specifika antidoter. [Treatment of acute poisonings (4): Treatment with specific antidotes.]** *Laekartidningen 68(Suppl. I): 79-86; 1971.* (9 references) (Swedish)

Specific antidote therapy for acute poisonings is reviewed. Anticholinergics such as atropine and oximes (pralidoxime and toxogonin (obidoxime)) are used as antidotes for cholinesterase inhibiting poisons. Atropine alleviates symptoms by inhibiting the combination of acetylcholine with muscarinic receptors and may be administered in doses 20-50 times greater than the toxic dose in severe poisonings. Intravenous 2 mg doses, repeated every five minutes initially, are used to treat severe parathion poisoning; physostigmine is an effective antidote for atropine in cases of overdose if administered intramuscularly or orally. Pralidoxime accelerates cholinesterase reactivation and can be used as an antidote combined with atropine for tetraethyl pyrophosphate (TEPP), parathion, and phosdrin (mevinphos). The normal intramuscular dose for fast resorption is 1.5 g, repeated every 3-4 hr, but slow intravenous administration is required in severe cases. While plasma concentrations of 2-4 μg/ml were effective, 5-10 μg/ml were more so. Toxogonin, resorbed rapidly after intramuscular injection, has a biological half-life of 80-110 min. Dimercaprol has been used as an antidote for arsenic, mercury, gold salts, chromium, nickel, and bismuth. Chronic copper poisoning can be treated with pencillamine (β, β-dimethylcysteine). Thiosulfate with or without rhodanase, methemoglobin, and especially their combinations are used for treating cyanide poisonings.

72-2572. Ui, J. (Fac. of Eng., Univ. of Tokyo, Tokyo, Japan). **Pollution disasters in Japan.** *Laekartidningen 69(23): 2789-2796; 1972.*

Japan is one of the most polluted countries in the world. Mass poisoning has resulted from mercury, cadmium, and polychlorinated biphenyls (PCBs), the latter having occurred in 1968 with effects still being observed in the victims. PCBs leaked into rice oil from a heat exchanger during the production process, and the rice oil was subsequently ingested. Although some of this "dark oil" had poisoned several chickens prior to the human disaster, the connection between the two incidents was not made until it was too late. The initial symptoms of the poisoning in humans were: inflammatory skin changes; muscular pain and paralysis; delayed symptoms which affected the liver, brain, and respiratory tract. A number of deaths occurred. PCBs are excreted very slowly from the body stores; prognosis for the victims of the poisoning is poor. The PCB content of fish has been found to be much higher in Japan than in other parts of the world. Another source of PCB contamination was found in carbonless copying paper, which when burned releases large amounts of PCBs into the atmosphere. The average value of PCBs in the body fat tissues of Japanese people has been reported as 5 ppm. The corresponding value for one of the rice-oil victims was 13 ppm, which represents a narrow margin for the average Japanese person.

72-2573. Imaizumi, K.; Atsumi, K.; Tanifuji, Y.; Ishikawa, Y.; Hoshi, H. (Iwate Med. Univ., Dept. of Ophthalmol., Iwate, Japan). **[Clinical observation of ophthalmic disturbances due to agricultural chemicals.]** *Nippon Ganka Kiyo (Folia Ophthalmol. Jap.) 22(3): 154-156; 1972.* (14 references) (Japanese)

An extensive eight-year survey of ophthalmic disturbances caused by blasticidin S revealed that the percentage of blasticidin users who suffered from some effects ranged from 4.3–34.2% between 1962 and 1968. The highest ratio appeared in 1962 when 2,694 out of the total 7,865 users suffered from some form of ophthalmic damage. Another small peak (18.2%) was noted in 1965, but the percentage of patients of the total number of users dropped to 4.3% by 1968. Some unusual clinical cases of eye disturbances caused by pesticides and herbicides are included: the strong contraction of pupils and widespread cornea epidermal separation caused by methylparathion; characteristic ripple turbidity in the cornea caused by PCP; semispherical membrane protrusion in the eyelids caused by NIP (nitrofen); the inflammation of Tenon's capsule caused by a splash of Difolatan; total loss of vision caused by endrin consumption; blasticidin corneal ulcers complicated by the coincidence of cyanomycosis.

72-2574. Dugel'nyy, G. A. (Ternopol' Med. Inst., Dept. Ophthalmol., Ternopol', USSR). **Trudovaya ekspertiza pri zabolevaniyakh i travmakh glaz u mekhanizatorov sel'skogo khozyaystva i u lits, imeyushchikh kontakt s yadokhimikatami. [Labor expertise on eye disease and trauma occurring among agricultural equipment operators and workers exposed directly to poisonous compounds.]** *Oftalmol. Zh. 26(6): 458-460; 1971.* (13 references) (Russian)

Because of the wide variety of pesticides used in modern agriculture, 1,995 mechanical workers and 2,272 students enrolled in agricultural technology schools were examined for eye conditions for preventive occupational medicine purposes. After correlation of the clinical findings with the occupational conditions, a series of contraindications was established for subjects involved in agricultural activities. Organophosphates such as methyldemeton and thiometon produced alterations in intraocular pressure, in the various eye layers, and in the gonioscopic and tonographic parameters. Therefore, persons with one eye, or suffering from hemeralopia, color blindness, conjunctivitis, trachoma, recurrent disease of the vascular layer, diseases of the retina, or glaucoma should be prevented from exposure to pesticides in their occupations. Further studies

focused on the action of specific pesticides on the eye would provide a differential approach to occupational safety problems.

72-2575. Cichecki, Z. (Panstwowy Szpital dla Nerwowo i Psychicznie Chorych, Morawica k/Kielc, Poland). **Halucynoza po zatruciu Foschlorem R-20. [Hallucinosis following intoxication with phoschlorine R-20.]** *Psychiat. Pol. 5(5): 607-609; 1971.* (Polish)

A 34-year-old diabetic attempted suicide by ingesting 150-250 ml of phoschlorine R-20 (trichlorfon). He gained consciousness after treatment with PAM (7 g in drop infusion) and atropine (20 g). Although his physical condition was good, he had to be transferred to the psychiatric hospital because of auditory and adducent hallucinations and paranoic delusions. Improvement was first noted after two weeks of drug (thioridazine up to 200 mg/day) therapy after which ergotherapy was also instituted. The patient was discharged seven months later.

72-2576. Gal, Gy.; Simon, L.; Rengei, B.; Mindszenty, L.; Ember, M. (First Surgical Clinic and Inst. of Forensic Med. of the Univ. Med. Sch., Szeged, Hungary). **Hemodialysis in the treatment of poisoning by methyl-parathion.** *Res. Commun. Chem. Pathol. Pharmacol. 1(4): 553-560; 1970.* (7 references)

Hemodialysis was used in 11 cases of parathion poisoning in which pronounced clinical symptoms persisted after conservative treatment. Six of the patients survived. It was found that the serum level of parathion was a more accurate indicator of intoxication than the serum ChE level, but a more rapid method for parathion determination was needed. Had results been available during treatment, four of the patients who died might have been saved by further dialysis. Initial serum levels, which ranged from 17.7 to 25.7 mg/l, were reduced to less than 0.8 mg/l by dialysis. Up to 390 mg of poison were removed.

72-2577. Ember, M.; Mindszenty, L.; Rengei, B.; Gal, Gy. (Inst. of Pub. Health and Contagious Dis. of Szeged, Szeged, Hungary). **Changes of vitamin A in blood and liver of organophosphorus poisoned suicides.** *Res. Commun. Chem. Pathol. Pharmacol. 1(4): 561-571; 1970.* (29 references)

Serum vitamin A and ChE levels were followed in attempted suicides treated for methyl parathion poisoning with atropine, pralidoxime, or Toxogonin R, (obidoxime) and hemodialysis in severe cases. In the three surviving patients the pattern of vitamin A and ChE levels was generally similar. In two of the patients vitamin A was low initially, returning to normal in about two wk, and in the third, a mild case, the levels were stable. The two parameters were low initially in the fatal cases, and liver vitamin A content was high in one of the cases and normal in two. All but one patient, whose case of organophosphate poisoning was clinically mild, exhibited a slower than normal vitamin A absorption. The results suggest that vitamin A esterase, which according to one author is responsible for hydrolysis of vitamin A esters in liver and thus release of retinol to the circulation, is also inhibited by methyl parathion.

72-2578. Guaraldi, G. P.; Pirolli, G. (Clinica delle Malattie Nervose e Mentali, Univ. di Modena, Modena, Italy). **Delirium tremens da antiparassitario organo-fosforico. [Delirium tremens from an organophosphate antiparasitic compound.]** *Riv. Neurol. 41: 188-195; 1972.* (33 references) (Italian)

A case of delirium tremens (D.T.) is described in relation to a 56-yr-old patient who was accidentally exposed to organophosphate and nicotine pesticides such as Ekatox and Nicatox. The patient was hospitalized two days after the incident with abdominal pain, vomiting, intense sweating, and unconsciousness. His condition became worse with tremor, hallucinations, and high fever. Treatment beginning the second day after hospitalization included PAM (2 g/day, i.v.), atropine (1 tg parenterally every hour subsequently and 1 tmg once every 8 hr), glucose, vitamins, antibiotics, analeptics, and liver extracts. The symptoms lasted six days, then respiratory condition improved and tremor decreased. A normal psychomotor condition was achieved 15 days after hospitalization. The patient was released 17 days after the incident, completely recovered.

72-2579. Dustman, E. H.; Stickel, L. F.; Blus, L. J.; Reichel, W. L.; Wiemeyer, S. N. (Patuxent Wildl. Res. Cent., Bureau of Sport Fish. and Wildl., Laurel, MD). **The occurrence and significance of polychlorinated biphenyls in the environment.** *Trans. N. Amer. Wildl. Natur. Resour. Conf. 36: 118-133; 1971.* (38 references)

Since polychlorinated biphenyls (PCBs) are used in paints, cartons, and insulating fluids, they seep into the environment as industrial effluent. Fish, shrimp, and crabs accumulate PCB residues and lose them slowly. In rats estrogen activity is affected. PCBs have been shown to be as toxic as DDE to many species of birds-those containing higher percentages of chlorine more toxic than those containing lower percentages. Presence of residues in hundreds of ppm, indicative of PCB poisoning, have been found in dead birds. PCBs affect microsomal activity in humans as well as in birds and lower resistance of mallard ducks to hepatitis virus. Behavioral changes occur in offspring of PCB-fed pheasants. Egg production, hatchability, and shell thickness in chickens were impaired by commercial preparations of PCBs, Aroclor 1254 and Aroclor 1242.

72-2580. Pearce, P. A. (Canadian Wildl. Serv., Dept. of Fish. and Forestry, Fredericton, N.B., Canada). **Side**

effects of forest spraying in New Brunswick. *Trans. N. Amer. Wildl. Natur. Resour. Conf. 36: 162-170; 1971.* (20 references)

A large-scale chemical operation, conducted in New Brunswick forests against defoliation by the spruce budworm, initially used DDT (16 oz per acre), a dosage halved for the six succeeding years. When the populations declined to endemic levels, the spraying was discontinued. DDT was used elsewhere until replaced by organophosphates. The DDT spraying, although not acutely toxic to birds, contaminated the forest areas with persistent residues. The damage to aquatic organisms from DDT sprays led to a requirement for a more acceptable insecticide. Phosphamidon proved toxic to the bird population at the original dose used along stream banks; fenitrothion had similar, though less marked effects. Modification of dosage and spraying technique (time of day, season) produced few observable effects on birds and achieved an acceptable degree of budworm control.

72-2581. Butt, K. M. (8 Kynance Mews, London, S.W.7., England). **Poisons and domestic pets.** *Vet. Rec. 90(6): 161; 1972.*

The lack of information given to householders and veterinarians by local councils and pest-control companies regarding toxicity of various pesticides is cited in a Letter-to-the-Editor. Accidental poisonings are common despite the "safety" of pesticides used. One company uses a product, only identified by code number, which requires methylamphetamine as an antidote. This drug is not available to veterinary surgeons. The suggestion is made that a color dye code known to the profession be included, with antidote and supportive therapy listed.

72-2582. Withers, A. R. (Vet. Practice Teaching Unit, Small Animal Clinic, Royal (Dick) School of Vet. Studies, Summerhall, Edinburgh, Scotland). **Thallium poisoning in the dog.** *Vet. Rec. 90(15): 429-430; 1972.* (2 references)

The poisoning of an 8-month-old Labrador retriever by thallium, increasingly used as a rodenticide, is described. No one saw the dog eat the poison, but he had free range of the premises. The first symptoms were frequent vomiting followed by anorexia, diarrhea, and pyrexia. With symptomatic treatment the vomiting stopped, but the anorexia continued. Acute vomiting recurred 2-3 days later with frequent spasms of acute abdominal pain, short periods of alertness, and a subsequent relapse into a semi-comatose state. Marked dyspnea was seen for two days. Distinct muscular twitching in the head and shoulder region, marked skin lesions on the upper lip and the pinnae of both ears, loss of hair, and swollen erythematous paws occurred. The dog died the next day. Once marked symptoms develop, the prognosis is grave. Oral administration of diphenylthiocarbazone or diethyldithiocarbamate together with potassium chloride are the recommended treatment.

72-2583. Pukach, L. P.; Shakov, V. D. (USSR Army). **Epileptiformnyye pripadki pri ostrykh otravleniyakh fosfororganicheskimi insektitsidami. [Epileptiform seizures during acute poisonings with organophosphorus insecticides.]** *Voenno Med. Zh. 10: 67-68; 1971.* (Russian)

A case of epileptiform seizures during a suicide attempt by ingesting thiophos (parathion) is described. The first epileptiform seizure of five min, accompanied by unconsciousness, occurred on the fifth day of the treatment when clinical symptoms of acute poisoning were no longer present. Such attacks in the form of tonic and then clonic convulsions recurred four times during the following day. The attacks were accompanied by cyanosis of the face and involuntary urination and defecation. Stiffness of the appendages and occipital muscles and intense elbow and knee reflexes were observed after the attacks. Hematological examinations revealed 83 units of hemoglobin, and erythrocyte count of 5,400,000, an erythrocyte sedimentation reaction of 8 mm/h, and a leukocyte count of 17,750. Such attacks, accompanied by recurring clinical symptoms of acute poisoning such as hyperhydrosis, bronchorrhea, myofibrillation, and myosis may be regarded as symptomatic epilepsy due to acute poisoning.

72-2584. Fukel'man, L. D.; Afonin, A. V. (USSR Army). **Ostroye otravleniye khlorofosom. [Acute Chlorophos poisoning.]** *Voenno Med. Zh. 11: 68-69; 1971.* (Russian)

A case of acute poisoning due to Chlorophos (trichlorfon) rubbed on the skin is described. Asthenia, headache, stomachache, nausea, repeated vomiting, diarrhea, and vertigo were the first symptoms of the poisoning. Hypersalivation, miosis, pale skin, slight ptosis, rigid occipital muscles, arrhythmic pulse, and green, liquid feces were observed on the second day. Cyanosis of the face and lips, arrhythmic pulse (104/min), an arterial pressure of 210/80 mm Hg, clonic-tonic convulsions, muscular fasciculations, and unconsciousness followed on the third day, despite atropine administration. Dysfunction of the pancreas (increased diastaseuria and glucosuria), and the adrenal glands (periodically increased arterial pressure), leukocytosis, lymphopenia, and increased erythrocyte sedimentation rate were seen at a later stage. The urine contained protein and fresh erythrocytes. The cholinesterase activity only normalized after 54 days.

72-2585. Yegiazarov, G. M. (USSR Army). **Yadokhimikaty, ispol'zuyemyye Armiyey SSHA vo V'yetname. [Pesticides deployed by the U.S. Army in Vietnam.]** *Voenno Med. Zh. 12: 76-78; 1971.* (Russian)

Pesticides deployed by the U.S. Army in Vietnam and their action on animals and man are described. Single doses of 2,4-D caused unstable gait and mydriasis in dogs, and myotonia and diarrhea in rabbits, white rats, and mice. The lethal dose in the rat was 375 mg/kg. Tremor, paralysis, and gingival hemorrhages in animals, and somnolence, irritation of the respiratory tract, and indigestion in man were observed during chronic poisoning. Cacodylic acid (Ansar) is generally toxic, and causes intense local irritation. The lethal dose in the mouse was 180 mg/kg. Calcium cyanamide in acute poisoning causes reddening of the skin of the face, neck, chest, and back, slight chills, and tachycardia. Fatigue, headache, and nasopharyngeal catarrh are indicative of chronic poisoning. The lethal doses in rabbit and man are 1.4 g/kg and 40-50 g, respectively.

72-2586. Cherpak, V. V.; Bezuglyy, V. P.; Kaskevich, L. M. (Dept. of Occup. Hyg. and Dis., Kiev Med. Inst., Kiev, USSR). **Sanitarno-gigiyenicheskaya kharakteristika usloviy truda i sostoyaniye zdorov'ya rabotayushchikh s tetrametiltiuramdisul'fidom (TMTD). [Sanitary and hygienic characteristics of working conditions and the state of health in persons working with tetramethylthiuram disulfide (TMTD).]** *Vrach. Delo 10: 136-139; 1971.* (8 references) (Russian)

TMTD concentrations were determined in the air, skin, and clothing of workers exposed to seeds treated with TMTD. Neural and myocardial disorders, a thyroid volume increase, upper respiratory tract infections, and hematological changes were diagnosed. Careful study of the condition of the thyroid gland is recommended in future medical examinations of these workers.

See also **72-2499** **72-2523** **72-2525** **72-2537**

72-2587. Krezel, Z.; Kosinkiewicz, B. (Dept. of Agr. Microbiol., Sch. of Agr.,Wroclaw, Poland). **The effect of herbicides on morphology of colonies and antibiotic activity of some *streptomycetes*.** *Acta Microbiol. Pol. 4(21): 3-8; 1972.* (9 references)

The effect of nine herbicides was tested on a number of strains of *streptomyces* in two different media at concentrations ranging from 1 to 1000 ppm. No changes in morphology, growth, or ability to produce antibiotics were generally observed at concentrations below 25 ppm. With the urea herbicides, aphalon (linuron), Tenoran (chloroxuron), and Aresin (monolinuron), at doses above 25 ppm, changes were seen in size, surface structure, color of the colonies, development of mycelium, and production of antibiotic substances. Aphalon, the most active, inhibited the growth of 43% of the strains and was used for more detailed studies. Effects varied depending on the medium. Carbamate herbicides exhibited the same changes but to a lesser degree. Only a few strains were sensitive to applied doses of triazines (atrazine, simazine, and prometryne).

72-2588. Narahashi, T. (Dept. of Physiol. and Pharmacol., Duke Univ. Med. Cent., Durham, NC). **Effects of insecticides on excitable tissues.** *Advan. Insect Physiol. 8: 1-93; 1971.* (257 references)

Several aspects of the excitable mechanism of the nervous system are discussed in relation to effects of insecticides. The process of insecticidal action is outlined to provide a basis for the discussion. Changes in nerve and muscle function caused by intoxication with DDT, lindane, aldrin, dieldrin, pyrethrins, allethrin, rotenone and its derivatives, and organophosphates are described, primarily in insects and crustaceans. The mechanism of action of DDT and allethrin at the cellular or membrane level is discussed in detail, as are electrophysiological techniques applied to various parameters which affect the mode of action. DDT and pyrethroids illustrate the effects of temperature on insecticidal action. Low nerve sensitivity to insecticides is included as one of the probable mechanisms of insect resistance. Relative effectiveness of various derivatives of organochlorines and pyrethroids illustrate what information exists concerning structure-activity relationships. Basic information on molecular mechanisms will be gained through continued application of classical electrophysiological tools and through the use of artificial membrane systems.

72-2589. Drudge, J. H.; Lyons, E. T. (Dept. of Vet. Sci., Agr. Exp. Sta. Univ. of Kentucky, Lexington, KY 40506). **Critical tests of a resin-pellet formulation of dichlorvos against internal parasites of the horse.** *Amer. J. Vet. Res. 33(7): 1365-1375; 1972.* (9 references)

Results of testing a relatively slow-release resin-pellet formulation of dichlorvos, V-4, in the horse revealed only one clinical sign of toxicosis, softening of feces. The symptom occurred in seven of the critical test horses given single doses in the feed. In four of the horses it lasted 1-2 days, but in three horses it persisted throughout the post-treatment period until necropsy. The horse given 28 consecutive daily doses of dichlorvos (10 mg/kg) also had softening of the feces on the second day. A decrease in plasma ChE of 80-90% (24 to 48 hr after treatment) was observed in six of the critical test horses treated with the formulation at 50 or 100 mg/kg as a single dose in the feed, and in three horses fed two 12.5-mg/kg or three 10-mg/kg daily doses. All five of the pregnant mares treated produced normal foals and the treated stallion has remained fertile.

72-2590. Prabhu, V. G.; Rise, N. L.; Oester, Y. T. (Dept. of Physiol. and Pharmacol., Chicago Coll. of Osteopathic Med., Chicago, IL). **The effect of experimental local inflammation on the action of barbiturates in the rat.** *Arch. Int. Pharmacodyn. Ther. 195: 343-350; 1972.* (18 references)

Localized inflammations were induced in rats by s.c. injections of aqueous suspensions of yeast, carrageenan, charcoal and by s.c. implantation of cotton pellets (granuloma). Actions of barbiturates were studied in separate experiments after a) 3 hours and b) 5 days of inflammation. A significant increase in the sleeping time and a decrease in the utilization rate of hexobarbital were noted only in those rats bearing 5-day-old yeast-induced inflammation. No differences in sleeping time or utilization rates of hexobarbital were found in other models of inflammation. The results of sleeping times of barbital, a non-metabolized barbiturate, were not significantly different. Hepatic microsomal enzyme stimulation after chlordane was not affected by these tissue inflammations. (Author abstract by permission)

72-2591. Glow, P. H.; Opit, L. J.; Charnock, J. S. (Dept. of Psychol. and Surgery, Univ. of Adelaide, S. Australia). **Elevated sodium plus potassium activated adenosinetriphosphatase in rats after chronic diisopropylfluorophosphate poisoning.** *Arch. Int. Pharmacodyn. Ther. 198: 22-28; 1972.* (15 references)

Rats treated with sublethal doses of DFP develop an increase in the specific $(Na^+ + K^+)$-ATPase activity of the heavy microsomal fraction of both brain and kidney homogenates prepared from these animals. The increase in activity was apparent after twelve weeks of treatment, and after twenty-four weeks the level of activity was about twice that of control animals. The increased enzymatic activity induced by DFP was not apparent two weeks after drug treatment was terminated. Apparently, microsomal enzyme induction follows treatment with DFP, but rapidly returns to control levels in the absence of this drug.

72-2592. Benthe, H. F.; Knop, J.; Schmoldt, A. (Pharmakol. Inst. der Univ. Hamburg, Hamburg, Germany). **Aufnahme und Verteilung nach Inhalation polychlorierter Biphenyle (PCB). [Absorption and distribution of polychlorinated biphenyls (PCBs) administered by inhalation.]** *Arch. Toxikol. 29(2): 85-95; 1972.* (18 references)

In male rats, after a single aerosol exposure to a PCB-mixture of low chlorinated biphenyls (Pydraul A 200, Monsanto), absorption and distribution were studied by measurements of PCB concentration in different organs. With this method of inhalatory application, a definitive absorption is shown. Depending on duration of PCB exposure, a rapid increase of PCB concentration in liver was observed; the concentration after 15 min was already more than 50% of the maximum concentration attained after nearly 2 hr (70 μg/g tissue). Concentration in fat after 30 min of exposure was 14 μg/g tissue (about 27% of liver concentration). In brain tissue only 9 μg PCB/g tissue (= 17% of liver concentration) was found at this time. Depending on the amount of time lapsed after the aerosol application, a rapid increase in PCB concentration in liver over 24 hr, accompanied by an increase in levels in brain and fat, was measured. In the course of 2 days brain and liver concentration fell to a minimum value, whereas in fat a maximum was reached (260 μg/g tissue) which remained constant afterward. There was no toxic fatty degeneration of liver under these experimental conditions. Explanation of PCB accumulation in liver and distribution from organ to fat is discussed. (Author abstract by permission)

72-2593. Benthe, H. F.; Schmoldt, A.; Schmidt, H. (Pharmakol. Inst. der Univ. Hamburg, Hamburg, Germany). **Induktion mikrosomaler Leberenzyme nach einmaliger Gabe von polychlorierten Biphenylen (PCB) und anschliessender Stress-Situation. [Induction of hepatic microsomal enzymes following a single oral dose of polychlorinated biphenyls (PCBs) and a subsequent stress situation.]** *Arch. Toxikol. 29(2): 97-106; 1972.* (20 references) (German)

One i.p. injection of PCBs induces a high stimulation of rat liver microsomal drug oxidizing enzymes; equimolar doses of tetrachlorobiphenyls are distinctly more effective than dichlorobiphenyls. The effect can still be demonstrated distinctly four weeks after application. During this time the liver concentration of tetrachlorobiphenyls decreased to 7 μg/g tissue whereas the concentration of adipose tissue rose to 252 μg/g. By stress tetrachlorobiphenyls are mobilized along with fat, causing an increase of liver concentration to 32 μg/g. Simultaneously, a new stimulation of microsomal activity can be seen, nearly equal to the maximum stimulation four days after i.p. application of 500 mg/kg b.w. Parallel to microsomal stimulation, there is an increase in relative liver weight. Stress induced activation of microsomal activity caused by PCB redistribution is important for the evaluation of PCBs in environmental toxicology, in view of rising PCB concentrations in human adipose tissue. (Author abstract by permission)

72-2594. Domschke, S.; Domschke, W. (Medizinische Klinik mit Poliklinik der Univ. Erlangen-Nuernberg, Erlangen-Nuernberg, Germany). **Der Einfluss von Alkylphosphaten auf die Nettoproduktion von Glucose und Harnstoff in der isoliert perfundierten Rattenleber. [The influence of alkyl phosphates on the net production of glucose and urea in the isolated perfused rat liver.]** *Arch. Toxikol. 29(2): 143-151; 1972.* (31 references) (German)

Subsequent to the s.c. application of soman (0.05 mg/kg) and diisopropylfluorophosphate (DFP) (1.0 mg/kg), respectively to Wistar rats, the liver content of ATP is decreased within 1 hr to 50% as compared to controls. The fall in ATP levels results in reduction of gluconeogenesis and urea production in alkylphosphate damaged liver. Simultaneously, an increase both of lactate/pyruvate and of β-hydroxy-butyrate/acetoacetate ratios can be observed exceeding normal values about 2- to 3-fold and thus indicating a more reduced state in cytoplasmic as well as in mitochondrial pyridine nucleotides. This change in the redox state of liver cells might be due to decreased utilization of reduction equivalents for biosynthetic processes, and to hypoxia. As metabolic effects communicated in the present study are not obvious in rats pretreated with atropine, alkylphosphate action on liver is apparently indirect and might be explained in terms of hypoxia and ischemia developed as a result of the accumulation of acetylcholine. (Author abstract by permission)

72-2595. Reiner, R. (Battelle-Inst. e. V., Frankfurt am Main, Germany). **Beziehung zwischen chemischer Struktur und Cholinesterase-reaktivierender Wirkung bei einer Reihe neuer unsymmetrischer Pyridiniumsalze. Teil III: Regressionsanalytische Berechnungen zur Vorhersage der biologischen Aktivitaet und zur vergleichenden Konformationsanalyse. [Relationship between chemical structure and cholinesterase-reactivating effect in a number of new asymmetric bis-quaternary pyridinium salts. Part III. Regression analysis calculation for predicting the biological activity and for comparative conformational analysis.]** *Arzneim.-Forsch. 21(12): 2032-2033; 1971.* (8 references) (German)

Assessment of the relationship between biological activity and chemical structure using regression analysis is based on the assumption that the degree and mode of action of a drug are determined by the sum of the action parameters of the substituents contained in the molecule and the basic skeleton. An analysis of this type was developed for a series of previously synthesized bis-pyridinium aldoximes and the results compared with the observed cholinesterase reactivating efficacy and inherent inhibition. Calculated and actual results were in

good agreement except in the case of compounds with oxygen bridges between the pyridine nuclei, such as TMB-4 and toxogonin (obidoxime). The acquisition of values for other compounds with different deprotonatable substituents and other bridging elements will assist in formulating a theory of the reactivation mechanism.

72-2596. Tzoneva-Maneva, M. T.; Kaloianova, F.; Georgieva, V. (High Med. Inst., Lab. for Med. Genetics and Sci. Res. Inst. of Labour Protect. and Prof. Dis., Sofia, Bulgaria). **Influence of diazinon and lindane on the mitotic activity and the caryotype of human lymphocytes, cultivated *in vitro*.** *Bibl. Haematol. (Basel) 38(Pt.1): 344-347; 1971.* (17 references)

Cell division and blast transformation were inhibited in cultivated human lymphocytes treated with diazinon at 1/40-1/800 LD50 in rats, or lindane, at 1/100 or 1/50 LD50 in rats. Breaking of separate chromatids in the chromosomes of a percentage of cells occurred. Toxic damage to a large percentage of the cells was evident and increased with increasing concentration of pesticide used. Both compounds appear to have a mutagenic effect on human lymphocytes. In sufficient concentration they may be immunodepressors.

72-2597. Mayer, R. T.; Himel, C. M. (Dept. of Entomol., Univ. of Georgia, Athens, GA 30601). **Dynamics of fluorescent probe-cholinesterase reactions.** *Biochemistry 11(11): 2082-2090; 1972.* (53 references)

Two active-site-directed, equilibrium fluorescent probes which are competitive inhibitors of horse serum ChE were used to study spectral effects in active-site interactions and the effects of environmental stresses on the enzyme system. The basic group in each probe molecule bound at the anionic site, and subsequent binding of the fluorescent moiety, was at an adjacent, hydrophobic site. Organochlorines competed for the hydrophobic site. The greatest decrease in complex fluorescence occurred with endosulfan. Decreases were also observed with polychlorinated biphenyls, dieldrin, heptachlor, *p,p'*-dichlorophenyl-2,2,2-trichloroethane (*p,p'*-DDT) and *p,p'*-dichlorophenyl-2,2-dichloroethylene (*p,p'*-DDE). No reaction occurred between the probes and the insecticides, and insecticides did not inhibit the active site of the enzyme.

72-2598. Gill, E. W.; Jones, G. (Univ. Dept. of Pharmacol., Oxford, England). **Brain levels of Δ^1-tetrahydrocannabinol and its metabolites in mice-correlation with behaviour, and the effect of the metabolic inhibitors SKF 525A and piperonyl butoxide.** *Biochem. Pharmacol. 21(16): 2237-2248; 1972.* (28 references)

Brain levels of Δ^1-tetrahydrocannabinol (Δ^1-THC) and its major metabolite (7-hydroxy-Δ^1-THC), following intravenous injection of tritium-labeled Δ^1-THC into mice, were measured and correlated with inhibition of spontaneous motor activity. Metabolism of Δ^1-THC to 7-hydroxy-Δ^1-THC was fast and both substances rapidly penetrated the C.N.S. Peak brain levels of both compounds occurred within 20 min of injection and the correlation between pharmacological response and brain concentration of either compound was equally good. Twenty min after injection more than 50 per cent of the radioactivity in blood was irreversibly bound, whereas only 12 per cent of the activity in brain was unextractable. SKF 525A (25 mg/kg i.p.) produced only a slight increase in the brain level of Δ^1-THC, but the level of 7-hydroxy-Δ^1-THC was increased nearly three-fold, presumably due to the inhibition of subsequent metabolic reactions. Piperonyl butoxide (100 mg/kg i.p.) produced an increase in the brain level of Δ^1-THC, but no change in the level of 7-hydroxy-Δ^1-THC. Higher doses of either inhibitor produced behavioral changes in the absence of Δ^1-THC. It is concluded that 7-hydroxy-Δ^1-THC is centrally active, but that it has not yet been demonstrated that the effects of injected Δ^1-THC are due solely to its primary metabolite.

72-2599. Fletcher, K.; Wyatt, I. (Imperial Chem. Ind. Ltd., Ind. Hyg. Res. Lab., Alderley Park, Nr. Macclesfield, Cheshire SK10 4TJ England). **The action of paraquat on the incorporation of palmitic acid into dipalmitoyl lecithin in mouse lungs.** *Brit. J. Exp. Pathol. 53(22): 225-230; 1972.* (24 references)

Treatment of mice with paraquat (125 mg/kg) did not significantly alter the amount of dipalmitoyl lecithin (DPL) in the lungs or its rate of destruction. Tritiated palmitate was found to be maximally incorporated into DPL 30 sec after injection, and the half-life of the compound was calculated to be 15.1 hr. Calculations were based on the specific activity of methyl palmitate, obtained by hydrolysis and methylation of the fatty acids of the DPL fraction. When animals were treated with paraquat for time intervals ranging from 5 to 144 hr and H^3-paraquat incorporation was measured at 4 min at the end of the interval, no difference was observed between treated and control animals. The specific activity of methyl palmitate, from mice treated with paraquat for 6 days and given tritiated palmitate 24 hr before death, was 13,000 ± 900 d/min/mg compared to 10,000 ± 2800 d/min/mg from controls. The difference was not significant. The results suggest that the biochemical action of paraquat is not related to phospholipid metabolism in the lung.

72-2600. Legheand, J. (Univ. de Lyon, Lyon, France). **Contribution a l'etude des intoxications par les organophosphores. Influence de cations Mn^{++} et Mg^{++} sur l'activite de la pralidoxine *in vivo*. [Intoxication with organophosphorus compounds. The effect of Mn^{++} and Mg^{++} cations on the activity of pralidoxime *in vivo*.]** *Bull. Med. Leg. Toxicol. Med. 15(2):101-102; 1972.* (French)

It has been shown that pralidoxime alone increases

the LD50 of diisopropyl-fluorophosphate (DFP) by 40%. However, in association with Mn^{++} and Mg^{++} the increase is 63% and 85% respectively. In mice a 28% reactivation of blood cholinesterase in sublethal intoxication (3 mg/kg.,i.p.) is obtained with pralidoxime alone, 43% when the compound is associated with Mn^{++}, and 37% when associated with Mg^{++}. The reactivating effect of pralidoxime was influenced by the dose: a large excess of the oxime destroyed its reactivating power. This limiting effect has not been observed when the compound was used with Mn^{++} or Mg^{++}. The use of Mg ions in therapeutic doses presents no danger. The toxic effect of Mn^{++} on the other hand is markedly reduced when it is employed as a labile complex with amino acids (such as histidine). Toxic effects were noted with 4.1 mg when Mn^{++} was used alone in slow perfusion as compared to 17.6 mg when used as a complex with histidine (His/Mn=2/1) The results indicate that preparations combining oximes with Mg^{++} or Mn^{++} could be used as antidotes for organophosphorus intoxications.

72-2601. Meiniel, R. (Univ. de Clermont-Ferrand, Biol. animale, B.P. 45, 63-Aubiere, France). **Etudes histochimiques du comportement du tissu adrenal et de quelques organes riches en glycogene apres traitement de l'embryon de Poulet au parathion et a la reserpine. [Histochemical studies on the effect of parathion and reserpine on adrenal tissue and glycogen rich organs of chick embryos.]** *C. R. Soc. Biol. 165 (9-10): 1918-1921; 1971.* (French)

Parathion (5 mg in olive oil) and reserpine (0.1 mg) were injected into the allantoid vesicle of chick embryos (Rhode Island Red male x Wyandotte white female) on the 16th day. The effect on catecholamines in adrenals and glycogen in liver, heart, and pectoral muscles was studied 5, 8, 15, and 22 hours after parathion and 3, 5, 8, 20, 24, and 28 hours after reserpine injection. Parathion caused a strong decrease of the pheochrome reaction in the adrenals; the Falck reaction gave inconsistent results. Reserpine had no effect on the pheochrome and Falck reaction at 5 and 8 hours, but both became progressively weaker after 20 hours. The liver glycogen showed a strong decrease 5 hours after parathion, recovery started at 8 hours, and normal glycogen levels were reached at 22 hours. Reserpine caused a slight increase in liver glycogen after 5 and 8 hours, which was followed by a decrease at 20 hours and then slow recovery after 28 hours. Neither compound had an effect on the glycogen content of the heart and pectoral muscle. It is concluded that both substances cause a diminution of catecholamines in the adrenals of chick embryo, but reserpine causes a more complete emptying of the adrenal cells. Under these conditions glycogenolysis occurs in the liver while the glycogen in the myocardium and skeletal muscle is unaffected.

72-2602. Legheand, J.; Cuisinaud, G.; Cier, A. (Fac. de Med. et de Pharmacie, Lyon, France). **Influence de quelques cations sur la reactivation des cholinesterases seriques chez la souris intoxiquee par le diisopropylfluorophosphate. [The effect of certain cations on the reactivation of serum cholinesterase in mice intoxicated with diisopropylfluorophosphate (DFP.)]** *C. R. Soc. Biol. 165(11): 2158-2161; 1971.* (French)

Groups of male IOPS OF mice (20 ± 2 g) were given intraperitoneal injections of either pralidoxime alone (30, 90, or 150 mg/kg) or a mixture of pralidoxime with Mn^{2+} (25 mg/kg) or Mg^{2+} (40 mg/kg) 30 minutes before administration of DEP (amount not specified). Increases in the LD50 of DFP by 33.3% (with 30 mg pralidoxime alone), 48.15% (with Mn^{2+}) and 85.19% (with Mg^{2+}) were noted. With 90 mg of pralidoxime, these figures rose to 40.74%, 62.9%, and 85.19%, respectively, and with 150 mg of oxime, to 100%, 115%, and 122%, respectively. Determination of serum cholinesterase (ChE) revealed that in mice intoxicated with 3 mg/kg of DFP, the maximum reactivating effect of pralidoxime alone (28%) was achieved at 30 mg/kg. It decreased at higher doses of the oxime (5% reactivation with 120 mg/kg). This dose-dependent limiting effect was suppressed by combining pralidoxime with Mn^{2+} or Mg^{2+} (38% and 48% reactivation respectively when added to 120 mg/kg of pralidoxime). It is suggested that this phenomenon is due to the formation of a labile complex which remains in a dynamic equilibrium with free oxime, thus maintaining the latter at an optimal concentration.

72-2603. Patocka, J. (J. E. Purkyne Postgrad. Res. Inst. of Military Med., Hradec Kralove, Czechoslovakia). **Reactivation of isopropyl-methylphosphonylated rat brain acetylcholinesterase by oximes.** *Collect. Czech. Chem. Commun. 37(3): 899-906; 1972.* (34 references)

The reactivating effect of four oximes on rat brain acetylcholinesterase inhibited by isopropyl-methylphosphonofluoridate was investigated *in vitro*. Trimedoxime was the most efficient reactivator and pralidoxime the least efficient. The activities of obidoxime and 1-(4-pyridiniumaldoxime)-3-diethylmethylammoniumpropane dibromide were about the same. Bimolecular rate constants were not independent of reactivator concentration, but increased with decreasing concentration of the reactivator, except in the case of pralidoxime. The most convenient concentration for comparison appeared to be that which brought about 10% reactivation. The R10 (concentration producing 10% reactivation) value might be in best correlation with the therapeutic efficiency of the compounds.

72-2604. Wills, J. H. (Inst. of Exp. Pathol. and Toxicol., Albany Med. Coll., Albany, NY). **The measurement and significance of changes in the cholinesterase activities of erythrocytes and plasma in man and animals.** *Crit. Rev.*

Toxicol. 1(2): 153-202; 1972. (313 references)

The value of estimating the activities of cholinesterases in blood as a measure of the seriousness of exposure to ChE inhibitors is examined in depth. Various types of cholinesterases and their derivation, function, and normal levels in a number of species are discussed, along with numerous techniques for determining their activity. A summary of the kinetics of enzyme-substrate interactions, factors modifying the interactions, and interactions of cholinesterases with inhibitors is included. General conclusions based on studies with animals and man are reached on the value of cholinesterase as an index of exposure to ChE inhibitors. *In vitro* inhibition of ChE activities of plasma and red blood cells parallels *in vivo* activity except that *in vivo* the more rapid regeneration of plasma ChE activity may lead to an apparent reversal of the respective susceptibilities to inhibition of these two fractions. Significant inhibition of either ChE activity is suggestive of exposure, but the possibility of genetic or congenital anomalies of the susceptibility of ChE to inactivation by inhibitors must be kept in mind. Significant exposure does not necessarily result in significant ChE inhibition. The only ChE with any functional significance is that within the neuroeffector junctions or the effector itself, and changes in this can be obscured by the existence of adaptive mechanisms. Many appropriate methods are available for estimating inactivation of cholinesterases.

72-2605. Clarkson, T. W. (Univ. of Rochester, Sch. of Med. and Dent., Rochester, NY). **Recent advances in the toxicology of mercury with emphasis on the alkylmercurials.** *Crit. Rev. Toxicol. 1(2): 203-234; 1972.* (124 references)

The extensive data on mercurials are reviewed from three aspects: the dose-response relationship; the metabolism of mercury in the living organism; and the use of antidotes in mercury poisoning. It can be seen from epidemiologic and toxicologic data that a dose response relationship does exist and that findings on other test organisms can in some cases be extrapolated to man. Unlike acute dosing, chronic exposure to low concentrations of mercury can lead to a variety of symptoms depending on the compound of mercury. Absorption, excretion, distribution, biotransformation, and detoxication are important factors in chronic exposure, Daily intake in man is difficult to estimate. It is essential to determine the different forms of mercury in the diet and the food-eating habits of the individuals in the population, in order to set useful guidelines for allowable concentrations of mercury. Successful models have been established describing the dose-body burden relationship following repeated inhalation or ingestion of alkyl mercurials, elemental mercury vapor, and inorganic salts. Individual doses of mercury behave independently of each other. Mercurials are very reactive, nonspecific enzyme inhibitors, and membrane poisons. Unsuccessful attempts have been made to elucidate the primary biochemical or membrane lesion. Metabolism studies have led to the development of antidotes like the diffusible thiol-containing complexing and chelating agents and polythiol resins.

72-2606. Hall, B. K. (Dept. of Biol., Dalhousie Univ., Halifax, Nova Scotia, Canada). **Thallium-induced achondroplasia in the embryonic chick.** *Develop. Biol. 28(1): 47-60; 1972.* (27 references)

Administration of 0.6 mg of thallium sulfate onto the chorioallantoic membrane in the chick embryo at seven days had a minimum lethal effect, but resulted in embryos which were 26% smaller than controls at the 18th day. After treatment onset of ossification was retarded two days. Parrot beak, micromelia, bent femur and tibia, and "wavy" sternum and ribs were exhibited in each treated embryo. By the 18th day the femur and tibia were 10% and 39% smaller than normal, respectively, based on femur or tibia wet wt per femur or tibia-free body wt. In these long bones the relative amount of cartilage decreased and the relative amount of bone increased in comparison with untreated control bones. The bones were severely bent and the periosteum had undergone cellular hyperplasia and was multilayered. Chondrocyte maturation was normal, but there was an indication that acid mucopolysaccharides were not being released into the intercellular matrix. Glycogen deposits, collagen, patterns of calcification, and alkaline phosphatase activity were normal. Areas of necrotic cartilage were found, usually in the bent region, affecting maturing hypertrophic chondrocytes. Minimal acid mucopolysaccharide was present in these cells. At 12 days of incubation a peak increase was observed in hydroxyproline in cartilage, while the level in bone had decreased. Hexosamine exhibited the opposite trend. Cartilage is apparently the primary site of action of thallium sulfate. Thallium could block synthesis of acid mucopolysaccharide or alter chondrocyte cell membranes to prevent their release.

72-2607. Spyker, J. M., (Univ. of Minnesota, Minneapolis, MN). **Methylmercury, mice and men.** *Diss. Abstr. Int. 32(8): 4364B; 1972.*

The aim of this investigation was to elucidate how maternal exposure to a low dose of methylmercury affects prenatal as well as postnatal development of the offspring. For the prenatal study, a complete factorial design was employed to evaluate the effect of maternal dosage of methylmercury dicyandiamide (MMD) and gestational day of exposure on teratogenicity, embryotoxicity, growth, and stage of development in fetuses of two strains of mice (A/Jax and 129/SvSl). A total of 667 females received ip injections of 0, 2, 4, or 8 mg MMD/kg bw in saline on one of days 6-13 of gestation and 2,280 implantation sites were subsequently examined. Results of autopsy on day 15 or day 18 of gestation revealed that MMD retarded growth in both

strains; retarded stage of development in strain 129; was embryolethal and teratogenic (brain, palate, or facial defects) in strain 129 if administered on days 9-13, but not if administered on days 6-8; was not embryolethal in strain A; and was teratogenic (palate and jaw defects) in strain A if injected on days 9-13. For the postnatal evaluation, a dose of 4 or 8 mg MMD/kg was injected on day 7, 9, 12, or 13 of gestation and females were allowed to deliver at term. Although offspring of treated mothers appeared grossly normal at birth, analysis indicated a significant decrease in percentage survival and weight gain at weaning. In addition, testing in the open-field at 30 days of age revealed significant differences from controls with respect to latency, backings, defecations, and urinations. The above results were dependent upon day of exposure, dosage of MMD, and rearing parent type (i.e., postnatal maternal residual drug effects). Evaluation of gait, righting, and swimming ability revealed signs of neuromuscular impairment after three weeks of age. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 72-5579).

72-2608. Balasubramaniam, A. (Louisiana State Univ. and Agr. and Mech. Coll., Baton Rouse, LA). **Effect of certain organochlorines on reproduction in chickens and mallard ducks.** *Diss. Abstr. Int. 32(9): 5230B; 1972.*

The effect of certain organochlorines on reproduction in chickens *(Gallus domesticus)* and mallard ducks *(Anas platyrhynchos)* was investigated by administering the test chemicals in the diet. Chickens were fed a ration containing 100 ppm of either *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDE or 10 ppm of dieldrin for 12 weeks. Each treatment was administered to 12 hens and 2 roosters held in a group pen. All organochlorines fed appeared in eggs unchanged, except *p,p'*-DDT. About 20% of the total residues in eggs of hens fed *p,p'*-DDT appeared as *p,p'*-DDE, and about 3% as *p,p'*-DDD (TDE). At the end of the experiment, 18% of the administered level of *o,p'*-DDT was detected in eggs while about 80% of the other organochlorines fed were present. No statistically significant differences were observed in eggshell thickness or strength, number of deformed eggs, egg production, or carbonic anhydrase activity of uterine tissue between treated and control hens during the experimental period. Shell weight of eggs laid by ducks fed either *p,p'*-DDE or Aroclor 1221 for 22-25 weeks was significantly reduced (-25.5% and -8%, respectively), when compared to eggs from control hens. Neither organochlorine significantly affected egg volume or density. However, egg weight was significantly reduced (-7.2%) in ducks fed *p,p'*-DDE. The calcium content of eggshells based on shell weight was significantly decreased in ducks fed either *p,p'*-DDE (-27.3%) or Aroclor 1221 (-9.6%). Observed egg production of 1-and 2-year-old ducks held in group pens was significantly decreased by feeding either *p,p'*-DDE or Aroclor 1221. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 72-3457.)

72-2609. Onikiyenko, F. A. (Inst. Occup. Hyg. and Dis., Kiev, USSR). **Aktivnost' nekotorykh fermentov krovi i pecheni zhivotnykh pri ostroy i khronicheskoy intoksikatsii sevinom. [The activity of certain blood and liver enzymes in animals subjected to acute and chronic Sevin (carbaryl) poisoning.]** *Farmakol. Toksikol. (Moscow) 35(2): 237-239; 1972.* (12 references) (Russian)

Acute treatment of albino male rats with Sevin (carbaryl) (400 mg/kg, p.o., single dose) produces a sharp inhibition of serum and liver cholinesterase activity, and an increase in serum and a decrease in liver alkaline phosphatase, transaminase, and arginase activities. Daily administration of 1/5 LD50 of carbaryl (144/kg p.o., 1 or 4 wk or 2.5 mo) produces similar treatment time dependent alterations. However, these are not as marked as with the acute treatment. A gradual regeneration of enzyme activity occurs after the chronic treatment is discontinued.

72-2610. Bonashevskaya, T. I.; Tabakova, S. A. (A.N. Sysin Inst. General and Communal Hyg. USSR Acad. Med. Sci. Moscow, USSR). **Morfologicheskiye izmeneniya v organakh belykh krys, vyzvannyye ingalyatsionnym vvedeniyem mikrokontsentratsiy khlorufosa. [Morphological alterations occurring in albino rat organs following inhalation of chlorofos.]** *Farmakol. Toksikol. (Moscow) 35(2): 240-241; 1972.* (2 references) (Russian)

Continuous inhalation of chlorofos (trichlorfon) in 1.0, 0.2, and 0.02 mg/m^3 concentrations for 90 days produced no morphological alterations in albino male rats. Exposure to 0.2 mg/m^3 chlorophos concentrations produced a widening of the capillaries in the interalveolar membranes of the lung, slight Disse space enlargements, the occurrence of blood cells in the perivascular spaces of the liver, and moderate hypertrophy of the bile duct epithelium. Severe alterations of the medullar and cortical canaliculi, including a densification of cortical epithelium, were found in the kidney. Alterations of the thyroid were observed at the parenchymal level. Alterations on a larger basis were produced after 1 mg/m^3 chlorofos exposure. Pesticide induced alterations of vascular permeability were considered the basic pathogenetic factor.

72-2611. Voytenko, G. A.; Podlinyayeva, M. Ye. (Kiev Inst. Occup. Hyg. and Dis., Kiev, USSR). **Toksichnost' i antikholinesteraznoye deystviye nekotorykh pestitsidov proizvodnykh *N*-metil- i *N*-fenil-karbaminovoy kislot. [Toxicity and anticholinesterase activity of some *N*-methyl- and *N*-phenylcarbamic acid-derived pesticidides.]** *Farmakol. Toksikol. (Moscow) 35(3): 356-360; 1972.* (13 references) (Russian)

Horse serum cholinesterase was inhibited *in vitro*

by Mesurol (methiocarb), Unden (propoxur), karbin (barban) and dicresyle (dicresyl) with a specific I50 of 5×10^{-6} *M*, 2.3×10^{-4} M, 6×10^{-4} *M*, and 7×10^{-5} *M*, respectively. Acute toxicity experiments performed on mice with each compound and Sevin (carbaryl) showed LD50 figures of 0.12, 0.46, 1.4, 1.6, and 1.8 m*M*/kg body weight respectively. The lack of correlation between the corresponding I50 and LD50 figures prohibited conclusions concerning the role of cholinesterase inhibition in the toxicodynamics. The Michaelis constants, determined for the interaction of each compound with mouse brain acetylcholinesterase (Lineweaver-Burke plot), indicated Mesurol to be the most active, Sevin to be less active, and Unden and dicresyle to be the least active compounds. Karbin produced minor effects on the acetylcholinesterase centers. Acetylcholinesterase inhibition is important in the mechanism of action of Mesurol and Sevin and of no significance in the toxicodynamics of karbin.

72-2612. Singlevich, T. E.; Barboriak, J. J. (Med. Coll. of Wisconsin, Milwaukee, WI 53193). **Dietary fat and microsomal enzyme induction.** *Fed. Proc. Fed. Amer. Soc. Exp. Biol. 31(2): 582Abs; 1972.*

Chronic administration of DDT or chlorcyelizine (CL) to rats increased microsomal enzyme activity (MEA) and hepatic triglyceride (HTG) levels; this effect was enhanced by ethanol (EtOH). Recently, it has been reported that dietary fat enhances hepatic P-450 content. In this study we investigated whether an increase in dietary fat affects the induction of MEA and HTG by DDT, CL, or 3,4-benzpyrene (BP) and whether this effect is also modified by EtOH. Male, Sprague-Dawley rats weighing about 275 g each received a 70% lard diet containing (in ppm) either 100 DDT, 500 CL, or 100 BP (7 rats/group). EtOH (15% v/v) was given in lieu of drinking water; pair-fed rats received isocaloric amounts of glucose. After 5 weeks, the animals on DDT showed an increase in *O*-demethylase activity and P-450 content, which was further enhanced by EtOH. HTG of the DDT group was 32.3 mg/g, and in the presence of EtOH, the HTG values rose to 48.4 mg/g. In the other groups, EtOH did not modify HTG (57.2 mg/g with CL and 52.7 mg/g with CL and EtOH; 25.7 mg/g with BP and 27.0 mg/g with BP and EtOH). The results indicate that the levels of dietary fat may affect the activity of some MEA inducers. (Author abstract by permission)

72-2613. Wright, A. S.; Potter, D.; Wooder, M. F.; Donninger, C.; Greenland, R. D. (Shell Res. Ltd., Sittingbourne, Kent, England). **The effects of dieldrin on the subcellular structure and function of mammalian liver cells.** *Food Cosmet. Toxicol. 10(3): 311-322; 1972.* (90 references)

The ingestion of dieldrin by male rats, male mice, female beagles, and male rhesus monkeys resulted in proliferation of the smooth endoplasmic reticulum of liver parenchymal cells. This change was associated with an enhanced activity of the liver microsomal mixed-function oxidase system. The dieldrin-induced alterations in liver subcellular structure and function were reversible in the rat, mouse, and dog, although regression was slow in the latter species. Regression was not studied in monkeys. Phenobarbitone elicited a similar response to dieldrin in the rat, mouse, and dog. Compound comparisons were not attempted in monkeys. The effects of the carcinogen, 4-amino-2,3-dimethylazobenzene, on mouse liver contrasted with the effects of dieldrin or phenobarbitone. Exposure to the carcinogen resulted in a depression of liver glucose-6- phosphatase activity with no increase in the activity of the liver microsomal mixed-function oxidase system. The significance of the results is discussed. (Author abstract by permission)

72-2614. Baldwin, M. K.; Robinson, J.; Parke, D. V. (Shell Res. Ltd., Tunstall Lab., Sittingbourne, Kent, England). **A comparison of the metabolism of HEOD (dieldrin) in the CFl mouse with that in the CFE rat.** *Food Cosmet. Toxicol. 10(3): 333-351; 1972.* (18 references)

HEOD labeled with ^{14}C was administered to CFE rats and CFl mice and the excreted radioactivity was examined to characterize the various HEOD metabolites. In addition to the pentachloroketone and 9-hydroxy metabolites, the identities of two further metabolites of HEOD in the rat were established. These are afecal metabolite, 6,7-*trans*-dihydroaldrindiol, and a urinary metabolite, the hexachlorohexahydromethanoindenedicarboxylic acid, which may be formed by oxidation of the diol. Three of the rat metabolites, but not the pentachloroketone, were found in the excreta of the CFl mouse. A sample of the new urinary metabolite of the rat was synthesized and shown to have an acute oral toxicity of $>$ 850 mg/kg in the CFl mouse. Prior induction of enzyme activity appeared to affect the production of urinary metabolites of HEOD in the CFE rat but not in the CFl mouse. (Author abstract by permission)

72-2615. Collins, T. F. X. (Div. of Toxicol., Food and Drug Admin., Dept. of Health, Education, and Welfare, Washington, DC 20204). **Dominant lethal assay. I. Captan.** *Food Cosmet. Toxicol. 10(3): 353-361; 1972.* (14 references)

Five daily ip doses or oral intubations of the fungicide captan, *N*-(trichloromethylthio)tetrahydrophthalimide, were given to male rats and mice, which were then mated to untreated females for 10 and 12 wk, respec-

tively, in an assay to determine dominant lethal potential. Triethylenemelamine served as a positive control. Captan produced negligible antifertility effects and a minimal reduction in the mean number of total implants per pregnancy. Increases in the mean number of early fetal deaths per pregnancy, a measure of mutagenic effect, were seen in both species after ip and oral administration. Significant linear trends were observed for the numbers of litters with two or more early deaths in both rats and mice. (Author abstract by permission)

72-2616. Collins, T. F. X. (Div. of Toxicol., Food and Drug Admin., Dept. of Health, Education, and Welfare, Washington, DC 20204). **Dominant lethal assay. II. Folpet and Difolatan.** *Food Cosmet. Toxicol. 10(3): 363-371; 1972.* (9 references)

The fungicides, folpet (*N*-(trichloromethylthio)-phthalimide) and Difolatan (captafol, *N*-(tetrachloroethylthio)tetrahydrophthalimide), were given to male rats in five daily ip or orally intubated doses. These rats were subsequently mated with untreated females for the following 10 wk in an assay designed to determine dominant lethal potential. Neither degrees of fertility nor mean total implants were affected by the compounds. Mean early deaths per pregnancy were consistently higher than those of the controls after either ip or oral administration of either compound. The percentages of litters with two or more early deaths showed statistically significant increases after treatment, and the increases appeared to be dose-related. (Author abstract by permission)

72-2617. Van Esch, G. J.; Kroes, R. (Lab. of Toxicol., Nat. Inst. of Pub. Health, Bilthoven, The Netherlands). **Long-term toxicity studies of chlorpropham and propham in mice and hamsters.** *Food Cosmet. Toxicol. 10(3): 373-381; 1972.* (10 references)

Isopropyl *N*-phenylcarbamate (propham; IPC) and isopropyl *N*-(3-chlorophenyl)-carbamate (chlorpropham; CIPC) were tested for carcinogenic properties in hamsters and mice. The hamsters were given 0.2% IPC or CIPC in the diet, while mice were given 0.1% CIPC by the same route, using 0.1% urethane as a positive control. Other mice were given sc injections of CIPC. All experiments included the necessary negative controls. Neither IPC nor CIPC caused any increase in tumor incidence in hamsters. In the mouse, urethane induced multiple lung tumors in nearly all the animals, whereas the tumor incidence in the CIPC group was of the same order as that of the control. In both of the latter groups, only solitary lung tumors were induced. Similarly, no increase in tumor rate followed sc application of CIPC. These results, showing no tumorigenic effect with either IPC or CIPC, are discussed in the light of data on the metabolism of these compounds. (Author abstract by permission)

72-2618. Anonymous. **Organophosphorus pesticides: biochemical and toxic effects.** *Food Cosmet. Toxicol. 10(3): 409-414; 1972.* (28 references)

Some recent developments in biochemical and toxic effects of organophosphates are reviewed. Biochemical effects recently observed in rats include a lack of effect of paraoxon and parathion on liver and plasma vitamin E, a variation in response of esterase activity dependent on concentration of diazinon, carbaryl, and methyl parathion, an increase in serum β-glucuronidase at low levels of organophosphates, and phosphorylation of a specific phenyl phenylacetate-hydrolyzing esterase in nervous tissue. In toxicity studies of chlorfenvinphos some growth retardation, ChE inhibition, and lower fertility and pup survival were observed. Fetal resorptions and decreased fetal and placental wt and some malformations have been observed with some organophosphates at doses causing toxic signs in the dams. Inducers of microsomal enzymes have reduced the toxicity of the insecticides. Potentiation has been noted with compounds which inhibit aliesterases and pseudocholinesterase better than they inhibit AChE. Low-protein diets affected acute toxicity of various insecticides. Variable effects were obtained with high cation diets. Acute exposure in humans does not result in delayed effects and is handled with atropine sulfate. Measures taken against general anoxia are necessary.

72-2619. Shtabskiy, B. M.; Gzhegotskiy, M. I.; Martynyuk, V. Z. (Med. Inst., Lvov, USSR). **Primeneniye metoda prizhiznennoy okraski tkaney dlya vyyavleniya deystviya malykh doz khimicheskikh veshchestv. [Application of the *in vivo* staining method to the detection of the effects of small doses of chemical substances.]** *Gig. Sanit. 36(1): 51-53; 1971.* (14 references) (Russian)

The effects of small oral doses of 11 different herbicides were detected by means of *in vivo* staining method in tissues of white rats after chronic poisoning over 12 months. The daily doses applied had been determined ineffective in previous experiments (1 mg/kg doses of pyramine (pyrazon), dichloral urea, and propazine; 0.5 mg/kg doses of celatox, prometryne, simazine, and atrazine; 0.1 mg/kg doses of trichlorpropionitrile, 0.25 mg/kg doses of MCPA, 0.05 mg/kg doses of (czeazin) (atrazine); and 3.5 mg/kg doses of sodium trichloroacetate (TCA). Statistically significant fluctuations of the sorption were determined in several tissues in all groups and corresponding sorption levels in the cerebral and cerebellar cortices, often even in the subcortical region and the spleen. Rates of neutral red sorption by tissues of cortex, subcortex, cerebellum, heart, spleen, liver, and kidney are given. No significant differences in the actions of the different herbicides were observed, and even the smallest doses proved to be effective. The *in vivo* staining method, as good as specific biochemical methods, should be extensively applied to toxicological investigations.

72-2620. Ekshtat, B. Ya.; Matveyeva, V. G.; Kerkis, Yu. Ya. (Sci. Res. Inst. of Hyg., Novosibirsk, USSR). **K voprosu o tsitogeneticheskom effekte preparata DDB. [On the cytogenic effect of DDB compounds.]** *Gig. Sanit. 36(12): 26-29; 1971.* (Russian)

The cytogenic effect of DDB (48.7% of 1,3-dichloroisobutane and 35.7% of 1,3-dichloroisobutylene plus 3,3-dicoloroisobutylene) was studied on bone marrow cells in C57Bl strain mice. Single doses of 100 mg/kg (one-fifth of LD50) were administered to two different groups intraperitoneally and intraventricularly, respectively. The animals were sacrificed eight hours to 10 days after administration. While statistically significant increases in the frequency of chromosome aberrations in both groups were observed, intraperitoneal doses reached higher maximum effect at an earlier stage than intraventricular doses (14±0.9% after 14 hours against 12±0.97% after 20 hours). A slow decrease in the frequency of aberrant anaphases and telophases was observed during the following ten days, with significantly increased values compared to the control. The mutagenic effect of organochlorine insecticides is due to peroxides, formed during decomposition, which may engage in various reactions with cells, particularly with protein components of the chromosomes.

72-2621. Krasovskiy, G. N.; Shigan, S. A. (Dept. Environ. Hyg., First (Sechenov) Moscow Med. Inst., Moscow,USSR). **Evaluation of the mechanism of the cumulative effect of toxic substances.** *Hyg. Sanit. 35(7): 17-21; 1970.* (12 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(7): 20-24; 1970, see Abstract no. 71-1457.

72-2622. Dinerman, A. A.; Lavrent'yeva, N. A.; Ilinskaya, N. A. (A. N. Sysin Gen. Environ. Hyg., Acad. Med. Sci., Moscow, USSR). **On the embroyotoxic effects of certain pesticides.** *Hyg. Sanit. 35(7): 39-42; 1970.*

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35 (7): 47-51; 1970, See Abstract no. 71-1458.

72-2623. Kuzmin'skaya, U. A.; Yakushko, V. E. (All-Union Res. Inst. Hyg. Toxicity Pestic., Polymers and Plastics, Kiev, USSR). **Effect of DDT and Sevin (carbaryl) on the activity of certain hepatic enzymes.** *Hyg. Sanit.35(7): 97-99; 1970.* (4 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(7): 123-126; 1970, see Abstract no. 71-1459.

72-2624. Pan'shina, T. N. (All-Union Res. Inst. Hyg. Toxicol. Pestic., Polymers and Plastics, Kiev, USSR). **Hygienic standard for the herbicide "propanide" (propanil) in industrial zone air.** *Hyg. Sanit. 35(8): 31-35; 1970.* (8 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(8): 204-208; 1970, see Abstract no. 71-2193.

72-2625. Dyadicheva, T. V. (Occup. Health Res. Inst., Kiev, USSR). **Toxic properties of the herbicide "yalan" (molinate) on inhalation.** *Hyg. Sanit. 35(8): 35-38; 1970.* (9 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(8): 209-212; 1970, see Abstract no. 71-2194.

72-2626. Shtenberg, A. I.; Khovayeva, L. A. (Lab. Pestic. Toxicol., Inst. of Nutrition, Acad. Med. Sci., Moscow, USSR). **Effect of Sevin (carbaryl) on the thyroid of rats maintained on synthetic balanced rations with differing iodine contents.** *Hyg. Sanit. 35(8): 119-122; 1970.* (8 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(8): 317-321; 1970, see Abstract no. 71-2195.

72-2627. Agan, Yu. S.; Sasinovich, L. M.; Voronina, L. Ya. (All-Union Res. Inst. Hyg. and Toxicol. of Pestic., Polymers, and Plastics, Kiev, USSR). **Long-term effect of certain pesticides on liver function.** *Hyg. Sanit. 35(9): 36-39; 1970.* (16 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(9): 388-392; 1970, see Abstract no. 71-2196.

72-2628. Golovan, D. I. (Marzeyev Res. Inst. of Gen. and Environ. Hyg., Kiev, USSR). **Experimental validation of permissible concentration of dianate (dicamba) and 2,3,6-trichlorobenzoic acid (2,3,6-TBA) in water bodies.** *Hyg. Sanit. 35(10): 14-17; 1970.* (8 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(10): 14-18; 1970, see Abstract no. 71-2486.

72-2629. Colosi-Esca, D.; Ariesan, M. (Inst. de Sanatate Pub. si Cercetari Med., Cluj, Rumania). **Date preliminarii asupra toxicitatii pesticidului "Fosfotox R." [Preliminary data on the toxicity of Fosfotox R.]** *Igiena 20(6): 345-352; 1971.* (10 references) (Rumanian)

To determine the toxicity of "Fosfotox R," a recent Rumanian pesticide corresponding to Rogor (dimethoate), preliminary tests were made on *Lupinus albus* seed germination and plant growth and on tadpoles. Purified 0.025-0.4% Rogor solutions inhibited seed germination; 0.1, 0.2, and 0.4% solutions substantially inhibited *Lupinus albus* plantlet growth. Minor growth inhibition was induced by 0.5% solutions. During

the first two days of the five-day observation period, growth stimulation occurred from a 0.25% solution; this was followed by a marked growth inhibition. Graphs are included describing tadpole mortality from 0.2 and 2.0% solutions. The effects of pH and solution freshness are also given.

72-2630. Dorough, H. W.; Mehendale, H. M.; Lin, T. (Dept. of Entomol., Univ. of Kentucky, Lexington, KY 40506). **Modification of carbaryl metabolism in rats with monoamine oxidase inhibitors.** *J. Econ. Entomol. 65(4): 958-962; 1972.* (12 references)

The rate of carbaryl metabolism by rats was decreased by simultaneously administering drugs commonly referred to as monoamine oxidase inhibitors and by prolonged exposure of the animals to one of the drugs in the drinking water. Conjugative mechanisms of metabolism were affected most by the drugs although oxidative and hydroxylative metabolism rates were reduced to some degree. Decreasing the rate of metabolism resulted in a slower rate of excretion of the carbamate from rats treated with the drugs. Tranylcypromine at 50 mg/kg, e.g., reduced excretion of carbaryl ^{14}C equivalents from rats by 50% during the first 48 hours after treatment. A rat intestine enzyme system, fortified with UDPGA, conjugated 1-naphthol but did not metabolize carbaryl. This *in vitro* conjugating system was inhibited by the monoamine oxidase inhibitors. The effect of these drugs on conjugation was not sufficient to suggest that they might enhance the action of pesticides under practical conditions. However, the data demonstrate that conjugation enzyme systems are sensitive to certain foreign chemicals and that more effective inhibitors of conjugation could be important in the safety and efficacy of chemicals used to control insect pests. (Author abstract by permission)

72-2631. Bull, D. L.; Whitten, C. J. (Entomol. Res. Div., Agr. Res. Serv., USDA, College Station, TX 77840). **The metabolism of Bay 93820 in cotton plants.** *J. Econ. Entomol. 65(4): 973-976; 1972.* (11 references)

Topical doses of Bay 93820 (isopropyl salicylate *O*-ester with *O*-methyl phosphoramidothioate) were less effective than methyl parathion against 3rd-stage larvae of organophosphate-resistant and -susceptible tobacco budworms, *Heliothis virescens* (F.). Studies of the fate of ^{32}P-labeled Bay 93820 in cotton plants in the field demonstrated that the compound apparently was metabolized to a single secondary toxicant, the oxygen analog (isopropyl salicylate ester with methyl phosphoramide), and to several unidentified nontoxic products. Both Bay 93820 and its oxygen analog were relatively nonpersistent. The oxygen analog was an extremely potent anticholinesterase agent and was about 40 times more active than methyl paraoxon, the toxic analog of methyl parathion. (Author abstract by permission)

72-2632. Foster, T. S.; Morley, H. V.; Purkayastha, R.; Greenhalgh, R.; Hunt, J. R. (Res. Branch, Canada Dept. of Agr., Ottawa, Ont., Canada). **Residues in eggs and tissues of hens fed a ration containing low levels of pesticides with and without charcoal.** *J. Econ. Entomol. 65(4): 982-988; 1972.* (24 references)

Chlordane (0.1 ppm), DDT (0.1 ppm), lindane (0.1 ppm), ethion (0.5 ppm), atrazine (0.5 ppm), and linuron (0.5 ppm) were added to the ration of laying hens. Only DDT and derivatives were detected in egg yolk prior to feeding the hens on the supplemented ration. Chlordane, DDT, and lindane were detected in egg yolk, and the amounts had increased to a maximum after being fed for six weeks. Three weeks after resuming normal feeding, residues were not detectable, or in the case of DDT, had decreased to the control level. No residues of atrazine, linuron, or ethion were observed in eggs, abdominal fat, or minced tissues. Prior to feeding the supplemented ration, only DDT and its metabolite DDE were detected in abdominal fat. After feeding the pesticides for six weeks, lindane and chlordane were detectable, and DDT and DDE increased 3- and 2- fold, respectively. Three weeks after normal feeding was resumed, lindane and chlordane residues were not measurable, DDT had significantly decreased, and DDE had increased 2-fold. Seven weeks after normal feeding was resumed, DDT had decreased to the control level, and DDE was approaching control level. Addition of 1% activated charcoal to the ration did not affect significantly the uptake of, or hasten the elimination of the low levels of pesticides fed in the diet. Neither charcoal nor pesticides affected significantly mortality, body weight changes, feed consumption, egg production, egg weight, or eggshell quality. (Author abstract by permission)

72-2633. Kunz, S. E.; Radeleff, R. D. (Agr. Res. Serv., U.S. Dept. of Agr., College Station, TX 77840). **Evaluation of the hazard of chlorpyrifos soil treatments on turkeys.** *J. Econ. Entomol. 65(4): 1208-1209; 1972.* (6 references)

Chlorpyrifos (Dursban) has been found promising as a soil treatment for chigger control on turkey ranges. In an assessment of the hazard of such a soil treatment, turkey toms 8 or 18 wk old were housed in pens sprayed with chlorpyrifos suspension at 4, 8, 16, or 32 lb active ingredient/acre. The sparse vegetation in the pens was readily consumed by the turkeys, even after spraying. No signs of toxicity were noted, except in the turkeys from the pen treated at the highest dosage. One turkey from this group showed mild ataxia and dullness on days 14-19 of the test. No differences were found in weight gain or cholinesterase activity between treated and untreated groups at the end of the 4-wk test period.

72-2634. Hashimoto, Y. (Res. Lab. for Biol. Sci., Nippon Soda Co. Ltd., Kanagawa-Prefect., Japan). A

species difference in absorption of pesticides, especially a miticide, MNFA). *Jikken Dobutsu (Exp. Animals) 21(2): 88-95; 1972.* (12 references) (Japanese)

Species differences in absorption of chemicals are discussed using MNFA, *N*-methyl-*N*-(1-naphthyl)) monofluoroacetamide, a substance with a high toxicological selectivity, as an example. The LD50s in μg/kg in several experimental animals for oral and dermal administration respectively, were: 250 and 370 in mouse; 110 and 300 in rat; 0.5 and 5.4 in guinea pig; 1.5 and 1.75 in rabbit; 2.5 and 4.0 in cat; 2.0 and 2.75 in dog; >300 and >800 in monkey. No large difference in toxicity was seen due to route of administration. A metabolic study using ^{3}H and ^{14}C labeled MNFA indicated the toxic action is caused by the released fluoroacetate's blocking of citric acid metabolism, resulting in the acid's accumulation in internal organs. No direct relationship was seen between the amount of citric acid accumulated and the intensity of symptoms. A relationship was found between the species-specific MNFA degrading enzyme activity and the toxicity. The major degradation product of MNFA was *N*-methyl-l-naphthylamine in mammalian liver.

72-2635. Samis, H. V.; Baird, M. B.; Massie, H. R. (Masonic Med. Res. Lab., Utica, NY 13501). **Renewal of catalase activity in *Drosophila* following treatment with 3-amino-1,2,4-triazole.** *J. Insect Physiol. 18: 991-1000; 1972.* (22 references)

One- and 3-wk-old male *Drosophila* grown on a medium containing approximately 0.5% 3-amino-1,2,4-triazole (amitrole) showed a 96% reduction in catalase activity within 12 hr. After a 12 hr lag following the transfer of the flies to a medium without amitrole, a continous renewal of enzyme activity occurred resulting in normal catalase levels within 1 wk. The rate of enzyme synthesis was calculated as 0.527 units/mg protein/hr with a first-order degradation rate of 1.2% hr in *Drosophila.* The abdomen contained the majority of the enzyme. Activity was directly proportional to enzyme concentration, inversely proportional to substrate concentration, unaffected by phosphate, and highest at a pH between 7 and 8.

72-2636. Neklesova, I. D.; Kudrina, M. A.; Iraidova, I. S.; Kalimullin, M. K. (A. Ye. Arbuzov Inst. Org. and Physical Chem.., USSR Acad. Sci., USSR). **O metabolizme efiroamidov fosfornoy kisloty. [The metabolism of phosphoric acid amidoesters.]** *Khim. Sel. Khoz. 9(11): 839-842; 1971.* (23 references) (Russian)

Toxicological investigations were performed on insects and warm-blooded animals with three phosphoric acid amidoesters derived from dichlorvos. *O*-Methyl-*O*-2,2-dichlorovinyl-*N*-dimethylamidophosphate, *O*-ethyl-*O*-2,2-dichlorovinyl-*N*-dimethylamidophosphate, and *O*-2,2-dichlorovinyl-*N*-tetramethyldiamidophosphate were designated as compounds II, III, and IV, respectively. II and III were active insecticides and cholinesterase (ChE) and aliesterase (AE) inhibitors in white mouse and house fly. Toxicity to the house fly and anti-ChE activity were correlated in II, III, and IV. In mice this correlation existed only with II and III, while IV had the highest toxicity despite its weak anti-ChE activity. IV acted specifically on the AE of the house fly and had a low toxicity to this insect. Replacement of a methyl group in II by an ethyl group in III increased the toxicity of the compound to warm-blooded animals (rats, mice, rabbits), but did not affect its insecticidal action. Introduction of a second dimethylamide group in IV seemed to decrease the anti-ChE activity. The slight cumulative tendency of II and the lack of correlation between anti-ChE activity and toxicity of IV in warm-blooded animals are caused by the detoxication of II and activation of IV occurring in the liver.

72-2637. Epifanio, C. E. (Dept. of Zool., Duke Univ., Durham, NC). **Effects of dieldrin-contaminated food on the development of *Leptodius floridanus* larvae.** *Mar. Biol. 13(4): 292-297; 1972.* (9 references)

In two experiments in which brine-shrimp nauplii with known levels of dieldrin were fed to crab larvae, survival in each stage and mean day of molt in each stage were significantly affected. Interaction of the effect of dieldrin and stage-of-development was insignificant. Survival and a delay in molt were dose-dependent. A delay in molt was noted at a dieldrin concentration in the shrimp of 5.49 ppm; at a concentration of 33.0 ppm no larvae completed their development. Residue found in zooplankton taken from five stations in Onslow Bay was 0.082 ppm, much lower than that found to affect the *Leptodius* larvae under laboratory conditions. In a previously published investigation, exposure to seawater containing 1 ppb dieldrin had an effect similar to that observed with a level of 19.8 ppm in this experiment.

72-2638. Ibragimova, G. Z. (Dept. of Communal Hyg., Tashkent Med. Inst., Tashkent, USSR). **Eksperimental'nyye issledovaniya k obosnovaniyu PDK intrationa v atmosfernom vozdukhe. [Experimental investigations concerning the adoption of hygienic standards for intrathion in the air.]** *Med. Zh. Uzb. 8: 45-46;1971.* (Russian)

Reflex and resorptive effects of intrathion (thiometon, M-81) were studied. The odor threshold was determined as 0.0025 mg/m^3. Intrathion in concentrations of 0.003 and 0.0025 mg/m^3 influenced the function of the visual analyzer. The conditioned electrocortical reflex was affected by concentrations of 0.0025 and 0.0014 mg/m^3, while 0.001 mg/m^3 was ineffective. The resorptive effects of three, different, small concentrations on white rats were investigated in a 92 hour-experiment. The highest dose caused both non-specific dysfunctions and pathological alterations, but the two lower doses induced no statistically significant alter-

ations. Reduced cholinesterase activity, increased coproporphyrinuria, decrease in the adrenal gland ascorbic acid level and reductions in the chronaxy coefficient of antagonistic muscles were observed. Dystrophic alterations of the cerebral cortex, chromatolysis, vacuolization and hyperchromia of the nerve cells, and catarrhal bronchitis, peribronchitis, and perivasculitis were found. The maximum allowable intrathion concentration in air should be 0.001 mg/m^3.

72-2639. Lund-Hoeie, K. (Norwegian Plant Protection Inst., Dept. of Weed Control, Vollebekk, Norway). **Uptake and metabolism of amitrole applied to the upper or lower leaf surfaces of four plant species.** *Meld. Norg. Landbrukshoegsk. 51(3): 1-10; 1972.* (8 references)

From 20 to 50% more amitrole-5-^{14}C was taken up when spot applied to the lower leaf surface than when applied to the upper leaf surface in excised leaves from Canada thistle, bracken fern, and bean *(Phaseolus vulgaris).* The fern had the greatest difference in uptake between the two surfaces and also had the highest stomatal densities on the abaxial leaf surface. Practically equal uptake and a 1:1 ratio of stomata densities were observed on the two surfaces of oat leaves. Canada thistle metabolized amitrole less rapidly after application to the lower surface. In bean and oat leaves, the mode of application had no effect on the rate of detoxification. Bracken ferns were unable to detoxify the herbicide. All of the species seemed to be most sensitive to amitrole treatment of the lower leaf surfaces, probably because of the higher stomatal density and thinner cuticle.

72-2640. Poland, A.; Kappas, A. (Rockefeller Univ., New York, NY 10021). **The metabolism of aminopyrine in chick embryo hepatic cell culture: effects of competitive substrates and carbon monoxide.** *Mol. Pharmacol. 7(6): 697-705; 1971.* (26 references)

The formation of 4-aminoantipyrine from aminopyrine by a culture of embryonic chick hepatic cells was inhibited by competitive inhibitors of aminopyrine metabolism *in vitro* including piperonyl butoxide. Cultures treated with piperonyl butoxide only partially recovered ability to metabolize aminopyrine after washout of the competing substrate. This could have been due to a cytotoxic effect or to the inability to wash out the drug, which has a high affinity for cytochrome P-450.

72-2641. Lorusso, D. J.; Suttie, J. W. (Dept of Biochem., Coll of Agr. and Life Sci., Univ. of Wisconsin, Madison, WI 53706). **Warfarin binding to microsomes isolated from normal and warfarin-resistant rat liver.** *Mol. Pharmacol. 8(2): 197-203; 1972.* (24 references)

Following incubation for 1.5 hr with [4-^{14}C] warfarin at 2.55 μM, rat liver microsomal membranes were found to contain 42.0 pmol/mg protein while ribosomes contained only 3.7 pmol/mg protein. A similar binding to ribosomes was observed when liver from warfarin-resistant rats was used. However, only 17.7 pmol/mg protein was bound to the membranes from these rats, and it was easily removed. Warfarin associated with microsomal membranes was bound to membrane components, probably proteins. Smooth microsomal fraction I and II had low RNA content and bound warfarin at 22 and 5 pmol/mg protein, respectively. Rough microsomes showed a high RNA content and bound 44 pmol/mg protein. Vitamin K deficiency caused a 24% increase in the amount of warfarin that could be bound to deoxycholate-treated microsomal membranes, which was overcome by administration of 1 mg of phylloquinone or its chloroanalog 1 hr before death. Warfarin binding *in vitro* was reduced 90% when animals were injected with warfarin 22 hr before death. Further investigation indicated that the binding was probably irreversible and not connected with cytochrome P-450; the presence of an altered warfarin-binding protein was probably responsible for warfarin resistance.

72-2642. Philpot, R. M.; Hodgson, E. (Dept. of Entomol., North Carolina State Univ., Raleigh, NC 27607). **The effect of piperonyl butoxide concentration on the formation of cytochrome P-450 difference spectra in hepatic microsomes from mice.** *Mol. Pharmacol. 8(2): 204-214; 1972.* (33 references)

Piperonyl butoxide (PBO) treatment of hepatic microsomes from mice in the presence of NADPH caused a reduction in the magnitude of each cytochrome P-450 difference spectrum examined. The maximum reductions for CO, ethyl isocyanide, *n*-octylamine and pyridine (II) were about 40%, while the reduction for (+)-benzphetamine was about 70%. Linear relationships were obtained for the formation of the type III spectrum produced by PBO, inhibition of the formation of the CO spectrum by PBO, and formation of the pyridine type II substrate spectrum at low pyridine concentrations. The relationships were curvilinear at high pyridine concentrations and with (+)-benzphetamine. PBO inhibited type II substrate spectrum formation at high pyridine concentrations. PBO appears to combine with cytochrome P-450 to inhibit ligand interaction effectively with the heme and type I binding sites. The presence of an additional cytochrome P-450 which does not bind PBO or type I substrates is suggested.

72-2643. Mehrle, P. M., DeClue, M. E.; Bloomfield, R. A. (Fish-Pestic. Res. Lab., Bur. Sport Fish. and Wild., US Dept. of Inter., Columbia, MO 65201). **Phenylalanine metabolism altered by dietary dieldrin.** *Nature 238(5365): 462-463; 1972.* (13 references)

Following administration of dieldrin in the food of rainbow trout at levels equivalent to 14, 43, 143, and 430μg/kg body wt/day for 300 days, a significant increase in serum phenylalanine was observed. At the highest dose, enzyme activity was about 1/3 normal, and

a decrease persisted when fish were maintained on control diets four mo after the study. Phenylalanine levels were between 7.3 and 8.3 mg% at all doses as compared to 5.5 mg% in controls. Urinary phenylpyruvic acid increased by 63% at the 43μg/kg dose, and by 97% and 83% at the next largest doses. Growth rates were not affected during the experiment. Wholebody dieldrin residues were 0.41, 0.79, 2.10 and 6.23 μg/g in the 14, 43, 143, and 430 μg/kg groups, respectively. Alteration of the phenylalanine hydroxylase system could be due to metabolic products from other pathways affected by dieldrin since no *in vitro* inhibition by dieldrin was observed. Preliminary results in rats have been similar to those in fish. Adaptability and survival may be affected by these changes.

72-2644. Jacobs, R. S.; Blaber, L. C. (Dept of Pharmacol. and Ther., Loyola Univ. Med. Center, Maywood, IL 60153). **The anti-curare action of sodium fluoride at the neuromuscular junction of cat tenuissimus muscle.** *Neuropharmacology 10(5): 607-612; 1971.* (17 references)

The anti-curare action of NaF was studied in cat tenuissimus muscle using intracellular micro-electrode techniques. EPP(end-plate potentials), amplitude, and rise-time increased significantly in the presence of D-tubocurarine at 3 μg/ml, 10 min after addition of 8 mmol NaF, but no significant change was observed in half-decay or resting membrane potential. In cut fiber preparations in the absence of D-tubocurarine, EPP amplitude decreased and rise-time and half-decay increased, contrary to expectation. At a stimulus frequency of 100/sec in a muscle blocked with 3 μg D-tubocurarine, the quantal content of each EPP increased significantly with NaF, probably because of an increased available store due to increased transmitter mobilization. Effects of fluoride on EPP time course and amplitude were found to be independent of stimulus frequency.

72-2645. Oshima, Y. (Fac. of Agr, Meiji Univ., Kawasaki Japan). **Salithion.** *Noyaku Seisan Gijutsu (Pestic. Tech.) 27: 1-12; 1972.* (Japanese)

The newly developed insecticide, Salithion (2-methoxy-4*H*-1,3,2- benzodioxaphosphorin 2-sulfide), produces typical symptoms of cholinesterase inhibition in mammals. Acute LD50 to some experimental animals in mg/kg are: 91.3 (mouse, oral), 81.6 (mouse, s.i.), 82-180 (several strains of rats, oral), 142 and 152 (male and female rats, s.i.), and 400 and 590 (male and female rat, dermal application). No abnormality was found histopathologically in organs of rats given up to 500 ppm Salithion in the feed. The no-effect level of the insecticide was concluded as 0.6 and 0.3 mg/kg/day, respectively, for male and female rats in 12 weeks of continuous administration. A neurotoxic potential was anticipated on the basis of the Salithion structure; however, no neurotoxic properties were seen upon gross and histopathologic examination of poultry which received up to 400 mg/kg of Salithion in acute, subacute, and chronic studies. The insecticide showed relatively low toxicity to young carp, with an LC50 (48 hr) of 20 ppm, compared to 8.2 ppm for fenitrothion. When orally administered to mice, about 98% of the ^{32}P-labeled Salithion was degraded and excreted within 24 hr, the part remaining in the body being identified as the oxo-analog.

72-2646. Mol, J. C. M.; Harrison, D. L.; Talfer, R. H. (Wallaceville Animal Res. Cent., Dept. of Agr., Private Bag, Upper Hutt, New Zealand). **Parathion: toxicity to sheep and persistence on pasture and in soil.** *N. Z. J. Agr. Res. 15(2): 306-320; 1972.* (18 references)

The acute oral minimum lethal dose of parathion to lambs was 40-50 mg/kg. A repeated daily dose of 2[illegible] mg/kg was sufficient to cause death in some animals. Depression, inappetance, salivation, restlessness, rapid breathing, partial paralysis of the hind quarters, and collapse began to appear 1 hr after dosing in animals that died after a single dose. Symptoms were similar in sheep that died from repeated doses. Surviving animals appeared normal after a few days. Sheep grazed immediately on pasture top-dressed with parathion at 3.4 kg and 6.7 kg a.i./ha showed slight scouring as the only symptom of toxicity. In these animals blood ChE levels dropped markedly and did not return to normal in 28 days. No parathion was found in their omental fat after 7 and 28 days of continuous grazing on treated pastures. No signs of poisoning appeared with less exposure, and depression of blood ChE decreased with increasing time of withholding sheep before exposure. Food intake was not affected by parathion exposure. The absence of acute toxicity in sheep with a calculated daily intake of 20 to 40 mg/kg was presumed due to detoxification of the gradually ingested dose. Parathion residues in topsoil decreased from 6.5 ppm to 4.7 ppm and from 10.7 ppm to 8.5 ppm in 3 mo after winter applications of 3.4 and 6.7 kg/ha. Little penetration was found below 2.5 cm and no parathion was found in soil after 8 mo. Pasture residues remained longer in grazed areas, probably because of recontamination from the soil. Macerated samples did not contain higher residues than surface-stripped samples.

72-2647. McQueen, E. G.; Owen, D.; Ferry, D. G. (Toxicol. Res. Unit, Med. Res. Counc. of New Zealand, Univ. of Otago Med. School, Dunedin, New Zealand). **Effect of phenytoin and other drugs in reducing serum DDT levels.** *N. Z. Med. J. 75(479): 208-211; 1972.* (11 references)

Mean serum DDT + DDE levels were found to be 44.1 ng/ml in controls, 26.1 ng/ml in patients on long-term (> 3 mo) therapy with drugs other than anticonvulsants, and 10.3 ng/ml in patients on long-term treatment with phenytoin. A significant correlation was

observed between DDT + DDE levels and the duration of phenytoin administration, the longest treatment resulting in the lowest levels of DDT + DDE. The mechanism of action of phenytoin is probably the stimulation of drug metabolizing enzymes.

72-2648. Hassall, K. A. (Dept. of Physiol and Biochem., The University, Reading, England). **Reductive dechlorination of DDT: the effect of some physical and chemical agents on DDD production by pigeon liver preparations.** *Pestic. Biochem. Physiol. 1 (3-4): 259-266; 1971.* (16 reference))

Anaerobic reductive dechlorination of DDT to DDD (TDE) by a 12,000 *g* supernatant preparation from pigeon livers proceeded linearly until about 70% of the DDT was consumed, even in the absence of exogenous cofactors. The pH optimum for the reaction was below 6, and the enzyme was inactivated at pH 3. Ferrous, ferric, and mercuric ions, but not lead, cobalt, manganous, and uranyl ions, were inhibitory at 3 to $5X10^{-4}M$. Inhibition was observed with 7% CO which was rapidly reversible. Sodium azide and potassium cyanide at $5X10^{-3}M$ were inhibitory. Storage at -70°C for 9 mo did not diminish activity, but activity was lost upon storage at -4°C or upon heating 20 min at 75°C. Addition of 100 μg of riboflavin and an NADPH-generating system to heat-treated supernatants resulted in almost complete conversion of DDT within 2 hr.

72-2649. Miyata, T.; Matsumura, F. (Dept. of Entomol., Univ. of Wisconsin, Madison, WI). **Partial purification of American cockroach enzymes degrading certain organophosphate insecticides.** *Pestic. Biochem. Physiol. 1 (3-4): 267-274; 1971.* (13 references)

Differential heat-deactivation, ammonium sulfate fractionation, DEAE-cellulose chromatography, and separation of body areas were used to partially purify organophosphate-metabolizing enzymes in the American cockroach. A separation of bands E1, E2, E3, E7, E9, E10, and E11, 12, previously separated by electrophoresis, was achieved. Fractions E1, E3, E7, and E11, 12 contained A-type esterases which degraded most of the organophosphates. Parathion was not degraded by these fractions and many fractions were contaminated with malathion carboxylesterase. Fraction E9 was predominantly B-type enzyme, malathion carboxylesterase.

72-2650. Miyamoto, J.; Nishida, T.; Ueda, K. (Res. Dept., Pestic. Div., Sumitoma Chem. Co., Ltd., Kasugade-cho, Kononhana-ku, Osaka, Japan). **Metabolic fate of resmethrin, 5-benzyl-3-furylmethyl *dl-trans*-chrysanthemate in the rat.** *Pestic. Biochem. Physiol. 1(3-4): 293-306; 1971.* (11 references)

Carbon-14-labeled resmethrin, administered orally to rats at a dose of 500 mg/kg, disappeared rapidly from the gastrointestinal tract. At 3 hr tissue and blood contained radioactivity. The highest concentrations were found in liver (203.8 μg resmethrin equivalent/g), lung (174.0 μg/g), kidney (147.0 μg/g), and heart (118.0 μg/g). At 93 hr more than half that observed at 3 hr was found in lung, kidney, muscle, and blood. A 3-wk period was required for complete elimination of the radioactivity into urine (36%) and feces (64%). The major urinary metabolite was 5-benzyl-3-furancarboxylic acid, free and conjugated. Other degradation products identified were α-(4-carboxy-2-furyl)- benzyl alcohol, 5-benzoyl-3-furancarboxylic acid, and conjugates of 5-(*p*- hydroxybenzyl)-3-furancarboxylic acid.

72-2651. Mehendale, H. M.; Dorough, H. W. (Nat. Inst. of Environ. Health Sci., Research Triangle Park, NC 27709). **Glucuronidation mechanisms in the rat and their significance in the metabolism of insecticides.** *Pestic. Biochem. Physiol. 1(3-4): 307-318; 1971.* (28 references)

All of the insecticide synergists tested, including piperonyl butoxide, MGK-264, isosafrole, *n*-propyl isome(propyl isome), Safrole, Sesamex, Sulfoxide, and Tropital (heliotropin acetal) inhibited the conjugation of 1-naphthol by liver microsomes and intestinal enzymes. Inhibition of the microsomal enzymes required a greater concentration of synergist. DDT, parathion, carbaryl (Sevin), and rotenone at $10^{-3}M$ did not inhibit the reaction. Carbaryl was conjugatively metabolized at a decreasing rate as the reaction was inhibited by decreasing the necessary cofactor (UDPGA), but no increase was observed in the quantity of organoextractable metabolites produced. Evidently oxidative and hydrolytic metabolism of carbamate cannot continue unless conjugation of the intermediates occurs. Since the cofactor $NADPH_2$ was necessary for carbaryl degradation by the microsomal system, it was not conjugated *per se*. This was also the case with Banol. Naphthol and 1-naphthyl *N*-hydroxymethylcarbamate were about 90% conjugated, while 40% of the 5-hydroxy-and 6-hydroxy-derivatives of carbaryl were conjugated by the same enzyme preparation. The results suggest that glucuronidation, or perhaps conjugation in general, should be considered as a means of controlling the toxicity of insecticides. Selective toxicity might be achieved with compounds which inhibit insect glucosylation but not mammalian glucuronidation.

72-2652. Chen, P. R. S.; Dauterman, W. C. (Dept. of Entomol., North Carolina State Univ., Raleigh, NC 27607). **Studies on the toxicity of dimethoate analogs and their hydrolysis by sheep liver amidase.** *Pestic. Biochem. Physiol. 1(3-4): 340-348; 1971.* (22 references)

The effects of structural changes in the dimethoate molecule on toxicity and on hydrolysis by sheep liver amidase were investigated. Of the *N*-alkyl analogs tested,

the *N*-methyl analog was the most toxic to mice and houseflies. In the *N,N*-dialkyl series, the *N,N,*-dimethyl analog was most toxic to mice, while the *N,N*-dimethyl, -diethyl and di-*n*-propyl analogs were equally toxic to houseflies. No correlation was observed between toxicity in mice and houseflies and rate of hydrolysis by sheep liver amidase. Structural changes in the *O,O*-dialkyl portion of the phosphorodithioate and modifications in the branching had pronounced effects on the rate of hydrolysis, indicating that a critical size is required by the enzyme. Azodrin, Bidrin, and dimethoxon, all amide-containing organophosphates, were not hydrolyzed by the amidase, but inhibited it. These findings may explain the difference in mammalian toxicity between dimethoate and the other amide- containing organophosphates.

72-2653. Hoffman, L. J.; Ford, I. M.; Menn, J. J. (Agr. Res. Cent., Stauffer Chemical Co., Mountain View, CA 94040). **Dyfonate metabolism studies. I. Absorption, distribution, and excretion of *O*-ethyl *S*-phenyl ethylphosphonodithioate in rats.** *Pestic. Biochem. Physiol. 1(3-4): 349- 355; 1971.* (10 references)

Within forty-eight hr after administration of a single oral or ip dose of Dyfonate labeled in the ring or in the thiophenyl moiety, rats excreted an average of 88.8% of the radioactivity in the urine and feces. Conditioning with nonlabeled Dyfonate did not alter the excretion pattern. Excretion of the radiocarbon after administration of Dyfonate labeled at the α-ethoxy carbon was essentially complete in four days, with approximately 91% being found in the urine. Only 62.5% of the radioactivity was present in the urine when Dyfonate T-^{35}S was used. Route of dosing (ip and oral) did not significantly affect the elimination pattern. Biliary excretion into the duodenum was found to be an important source of radioactive material excreted in the feces. Tissue residues were very small and had virtually disappeared by the 16th day.

72-2654. McBain, J. B.; Hoffman, L. J.; Menn, J. J.; Casida, J. E. (Agr. Res. Cent., Stauffer Chemical Co., Mountain View, CA 94040). **Dyfonate metabolism studies. II. Metabolic pathway of *O*-ethyl *S*-phenyl ethyl-phosphonodithioate in rats.** *Pestic. Biochem. Physiol. 1(3-4): 345- 365; 1971.* (22 references)

The metabolic pathway for Dyfonate in rats was investigated and the toxicity of some metabolites determined. Small amounts of organo-soluble compounds, primarily Dyfonate, $MPSO_2$, and MPSO were isolated from urine and feces. The majority of the radioactivity recovered was in the form of polar metabolites; the pathway is apparently similar to that in plants. *O*-ethyl ethane phosphothioic and -phosphonic acids and *O*-conjugates of 3- and 4-(hydroxyphenyl)methyl sulfone were the terminal residues. *In vitro* incubation with rat liver microsomes yielded the oxon as well as those compounds obtained *in vivo*, indicating that the oxon is rapidly hydrolyzed *in vivo*. The oxon had a higher anticholinesterase activity and was considerably more toxic to rats and *Gambusia* than Dyfonate. Other metabolites were found to be much less toxic.

72-2655. Wiygul, G.; Mitlin, N.; Thompson, A. C. (Entomol. Res. Div., Agr. Res. Serv., USDA, State College, MS 39762). **Metabolism of busulfan in the boll weevil (*Anthonomus grandis* Boheman).** *Pestic. Biochem. Physiol. 1(3-4): 418-423; 1971.* (15 references)

The butanediol portion of busulfan entered into a number of metabolic reactions in the boll weevil. Twenty-four hr after ingestion of ^{3}H-or ^{14}C-labeled busulfan, after most of the metabolism took place, 1.5% of the administered radioactivity in the weevil was identified as organic acids, 6.52% as compounds that gave a positive aldehyde test with 2,4-dinitrophenylhydrazine, and 3.04% as 1,4-butanediol. CO_2, sulfolane, some amino acids, and an amine also accounted for some of the radioactivity. A total of 34.32% of the radioactivity appeared in the feces, including 1.09% unmetabolized busulfan, 2.40% 1,4-butanediol, and 6.53% organic acids 72 hr post injection. Methanesulfonic acid was determined as a metabolite using unlabeled busulfan.

72-2656. Knowles, C. O.; Ahmad, S. (Dept. Entomol., Univ. Missouri, Columbia, MO 65201). **Mode of action studies with formetanate and formparanate acaricides.** *Pestic. Biochem. Physiol. 1(3-4): 445- 452; 1972.* (21 references)

The LD50 values for formetanate and formparanate by injection were in the range of 4.0-4.7 mg/kg for the rat and housefly. Onset of symptoms and death was more rapid in the rat, and rats surviving after 40 min returned to normal within 320 min. The LC50 values in two-spotted spider mites were 7.5 and 8.0 ppm, respectively, for formetanate and formparanate by topical application. Both acaricides were moderately potent AChE inhibitors *in vitro*, and a good correlation was obtained between toxicity and AChE inhibition *in vivo*. During the period of the most severe symptoms of poisoning (10-40 min in the rat), AChE was reduced to 70% of normal. Analyses of rat brains, housefly heads, and whole spider mites at various times after treatment with formetanate-^{14}C indicated that the acaricide concentration was directly related to inhibition of AChE. Blockage of AChE by these compounds is probably the fundamental biochemical lesion.

72-2657. Wallnoefer, P. R.; Safe, S.; Hutzinger, O. (Bayerische Landesanstalt fuer Bodenkultur, Pflanzenbau and Pflanzenschutz, Munich, Germany). **Metabolism of the systemic fungicides 2-methylbenzani-**

lide and 2-chlorobenzanilide by *Rhizopus japonicus*. *Pestic. Biochem. Physiol. 1(3-4): 458-463; 1971.* (5 references)

The metabolism of 2-methylbenzanilide (BAS-305) and 2-chlorobenzanilide (BAS-307) by *Rhizopus japonicus* was investigated. Metabolites could be determined in the medium at the beginning of the exponential growth phase and reached their highest concentration at the end of fungal growth. The major metabolite of 2-methylbenzanilide was identified by IR, UV, NMR, and MS analysis as 2-methyl-4-hydroxybenzanilide. The major metabolite of 2-chlorobenzanilide was also found to be the corresponding *p*-hydroxyanilino derivative. Comparative studies of several isomeric hydroxyanilides synthesized in the laboratory confirmed the identifications.

72-2658. Hansen, L. G.; Hodgson, E. (Dept. of Entomol., North Carolina State Univ, Raleigh, NC 27607). **Metabolism of napthalene and 1-naphthol by enzyme preparations from the housefly, *Musca domestica*.** *Pestic. Biochem. Physiol. 1(3-4): 464-471; 1971.* (5 references)

Naphthalene was metabolized by housefly microsomes to products similar to those observed in mammalian metabolism of naphthalene — 1-naphthol, and possibly dihyrodiol. Th pH optimum for 1-naphthol formation was between 7.8 and 8.2, the range associated with microsomal oxidations in insects, and the production of dihydrodiol had two optima. Comparing loss of 1-naphthol in the presence of bovine serum albumin (without microsomes), microscomes and heated microsomes indicated that its disappearance was associated with an oxidative microsomal enzyme system. Since a high proportion of activity remained, however, in the absence of NADPH and a low sensitivity to CO inhibition was observed, a second system apparently metabolizes some of the 1-naphthol. Intracellular distribution of 1-naphthol also indicated two metabolic routes. 1-Naphthol inhibited both naphthalene hydroxylation and *p*-nitroanisole demethylation. The kinetics of both reactions were of the mixed type.

72-2659. Sonawane, B. R.; Knowles, C. O. (Dept. of Entomol., Univ. of Missouri, Columbia, MO 65201). **Comparative metabolism of two carbanilate herbicides (EP-475 and phenmedipham) in rats.** *Pestic. Biochem. Physiol. 1(3-4): 472-482; 1971.* (11 references)

In vivo and *in vitro* studies were carried out to determine the metabolic fate of EP-475 (ethyl *m*-hydroxycarbanilate carbanilate) and phenmedipham. Both compounds were rapidly metabolized and eliminated when administered orally to rats. By 72 hr post-treatment 95.4% and 99.1% of the radioactivity administered as EP-475 and phenmedipham, respectively, were recovered. The major metabolites were the hydrolysis products of each material, ethyl-*N*(3-hydroxyphenyl)-carbamate (EHPC) and methyl-*N*-(3-hydroxyphenyl)- carbamate (MHPC). The hydroxyphenylcarbamates were subsequently cleaved to *m*-aminophenol, which was then *N*-acetylated. Conjugated metabolites were also isolated. The respective hydroxyphenylcarbamates were major metabolites *in vitro* when herbicides were incubated with rat hepatic subcellular fractions. The degradation was also catalyzed by human, chicken, cow, and rat blood plasma. DFP and carbaryl inhibited *in vitro* reaction.

72-2660. Kar, P. P.; Matin, M. A. (Ind. Toxicol. Res. Cent., Chattar Manzil Palace, Lucknow, U. P., India). **Duration of diazinon induced changes in the brain acetylcholine of rats.** *Pharmacol. Res. Commun. 3(4): 351-354; 1971.* (7 references)

The brain acetylcholine chloride level in rats was 4.75 μg/g, assayed on guinea pig ileum, 1 hr after subcutaneous administration of diazinon (45 mg/kg); in controls it was 2.78 μg/g. The level was 4.89 μg/g 24 hr after administration; 3.15 μg/g 72 hr and 2.74 μg/g 96 hr. The duration of diazinon-induced changes in brain ACh appears to be short compared to effects observed in plants. Rapid *in vitro* metabolism by rat liver and activation of diazinon in plants are probably responsible for the difference.

72-2661. Filip, J.; Sikulova, J.; Novak, L.; Hosek, B. (Inst. of Biophys., Czechoslovak Acad. of Sci., Brno, Czechoslovakia). **Radioprotective effect of different doses of sodium fluoroacetate on mice irradiated in a gas mixture with a high oxygen concentration.** *Physiol. Bohemoslov. 20(3): 269-275; 1971.* (9 references)

The radioprotective effect of sodium fluoroacetate was investigated in mice at 5 mg/kg and 10 mg/kg. The higher dose did not increase the protective effect, but prolonged the duration of maximum effect up to the third hr at exposures from 700 to 975 R. No survival differences were observed between mice irradiated in air and in high oxygen mixture, except at the interval 1 hr after the 5 mg/kg dose. The results are in agreement with the concept that fluoroacetate blocks the Krebs cycle at the enzyme aconitase, causing a rapid decrease in metabolic processes and a simultaneous decrease in radiosensitivity, which have a duration dependent on the size of the dose of fluoroacetate.

72-2662. Vial, J.; Ostrovsky, V.; Monterrat, G. (Station Experimental, CIBA-Geigy, 30 - Aigues-Vives, France). **Un nouvel acaricide: le dibromobenzilate d'isopropyle. [A new acaricide: isopropyl dibromobenzilate.]** *Phytiat.-Phytopharm. 20: 31-43; 1971.* (French)

Characteristics of the new specific acaricide isopropyl dibromobenzilate (isopropyl ester of 4,4'-dibromobenzilic acid) are described on the basis of preliminary

experiments. The ovicidal effect of this product is slow but more powerful than that of dicofol; the larvicidal activity is comparable to that of dicofol. No harmful effects on bees, Anthoconidae, Chrysopidae, and Coccinellidae were observed. No resistance developed in *Panonychus ulmi*. The product is relatively stable in a neutral to slightly acid medium. The rate of excretion in urine and feces of rats and cattle is 90%, and the only metabolite known presently is 4,4'-dibromobenzilic acid. Toxicological tests on mammals revealed very low acute oral toxicity. An oral LD50 of 5,000 mg/kg in rat was found, while doses of 100 ppm (5-10 mg/kg daily) in rat and 250 mg/kg (5 mg/kg daily) in dog had no effect. The daily allowable intake for a human weighing 60 kg is 3.6 mg, based on a safety factor of 100.

72-2663. Frear, D. S.; Swanson, H. R. (Plant Res. Div., USDA, Metabolism and Radiation Res. Lab., Fargo ND 58102). **New metabolites of monuron in excised cotton leaves.** *Phytochemistry 11(6): 1919-1929; 1972.* (22 references)

Two polar metabolites of monuron in excised cotton leaves, phenylurea *N*-hydroxymethylglucosides, were isolated and characterized by TLC and Sephadex G-10 chromatography. The metabolites were stable in neutral aqueous solutions. The aglycone portion of metabolite I was found by acid hydrolysis to contain formaldehyde and monomethylmonuron in a molar ratio of 1:1. That portion of metabolite II contained equal molar quantities of formaldehyde and 4-chlorophenylurea. The carbohydrate moiety was identified as glucose in both breakdown products. Metabolites I and II were identified as β-D-glucosides of 3-(4-chlorophenyl)-1-methyl-1-hydroxymethylurea and 3-(4-chlorophenyl)-1-hydroxymethylurea, intermediates in the oxidative *N*-demethylation of monuron. Results of a time course indicated rapid depletion of monuron followed by a rapid, but transitory, accumulation of monomethylmonuron and an almost simultaneous formation of 3-(4-chlorophenyl)-1-hydroxymethylurea and 4-chlorophenylurea and metabolites I and II, which had a maximum accumulation at 24 hr. The prevention of the formation of appreciable concentrations of 4-chlorophenylurea is important since it is has been shown to inhibit the *N*-demethylation of monuron. A proposed scheme for the metabolism of monuron is included.

72-2664. Van Jaarsveld, J. H. (Plant Protection Res. Inst., Pretoria, S. Africa). **A laboratory study on the toxicity of dieldrin to fresh water invertebrates.** *Phytophylactica 2: 269-274; 1970.* (12 references)

Results of an investigation of the susceptibility of a variety of fresh water invertebrates to dieldrin show that differences in toxicity to surface, midwater, and benthic species can occur depending on the formulation used. The xylene styrene polymer (XSP) solution, because of its high surface-tension, remains on the surface immediately after application and causes a more rapid intoxication of surface fauna than that observed with the emulsifiable concentrate (EC). The XSP settles to the bottom with time, whereas the EC produces a constant concentration of dieldrin over the exposure period. Immature forms of *Neuroceanis discolor* and *Cheumatopsyche thomasseti* were found to be excessively susceptible to both formulations of dieldrin. Only *Aulonogyrus abdominalis* had a 24-hr LC50 below 0.01 mg/l, the concentration in 0.6 m water after a typical application in South Africa.

72-2665. Pradhan, S. N.; Mhatre, R. M. (Dept. of Pharmacol., Howard Univ., College of Med., Washington, D.C.). **Effects of two anticholinesterases on behavior and cholinesterase activity in rats.** *Res. Commun. Chem. Pathol. Pharmacol. 1(5): 682-690; 1970.* (13 references)

Physostigmine (0.05 to 0.2 mg/kg intraperitoneally) decreased spontaneous motor activity in rats up to 76%. At doses of 0.2 and 0.4 mg/kg the effect persisted up to 1 hr. Both food and water consumption were reduced by doses of 0.2 and 0.4 mg/kg, and doses of 0.05 to 0.4 mg/kg decreased fixed-ratio water reinforcement and time-out (TO) responses. A variable effect on avoidance response was observed. Malathion (25 to 100 mg/kg subcutaneously) caused a variable general increase in spontaneous motor activity. At 200 and 300 mg/kg it significantly decreased FR water reinforcement and the running rate, and affected TO responses variably. Behavioral depression with physostigmine could be correlated with a decrease in brain AChE activity. Following administration of 0.1 mg/kg, activity decreased up to 50% at 8 min and at 1 hr was still below normal. Decrease in activity of brain ChE after 200 and 300 mg/kg malathion was not appreciable and a slight increase in activity was observed at 32 min.

72-2666. Gershbein, L. L; (Northwest Inst. for Med. Res., Chicago, IL 60634). **Effect of insecticides on rat liver regeneration.** *Res. Commun. Chem. Pathol. Pharmacol. 1(6): 740-748; 1970.* (17 references)

DDT (150 ppm) fed to young male rats significantly increased liver regeneration following partial hepatectomy. Methoxychlor (200 ppm), aldrin (50 ppm), dieldrin (50 ppm), and heptachlor (50 ppm) did not affect regeneration. Liver increments increased by 0.303 g with 200 ppm DDE, an activity slightly less than that of DDT. In females the liver increment was not influenced by 225 ppm DDT or DDE. In intact rats fed DDT at 150 ppm the ratios of wet and dry liver to total body weights over a 9-day period were significantly elevated in males, but not in females.

72-2667. Bickers, D. R.; Harber, L. C.; Kappas, A.; Alvares, A. P. (Rockefeller Univ., New York, NY 10021). **Polychlorinated biphenyls: comparative effects of high and low chlorine containing Aroclors on hepatic mixed function oxidase.** *Res. Commun. Chem. Pathol. Pharmacol. 3(3): 505-512; 1972.* (17 references)

Six day intraperitoneal treatment of rats with Aroclor 1254 at 25 mg/kg resulted in a significant increase in microsomal protein content, aniline hydroxylase, ethylmorphine *N*-demethylase, and cytochromes P-450 and b_5. Aroclor 1016 at the same dose caused significant increases only in ethylmorphine *N*-demethylase and cytochrome P-450. These two activities were enhanced 3-fold with Aroclor 1254, the more highly chlorinated compound, and 1.4-fold with Aroclor 1016. Lower doses of the two polychlorinated biphenyls (PCBs) produced similar differences in induction of microsomal enzymes. Paralysis following administration of zoxazolamine was abolished when rats were pretreated for six days with 25 mg/kg Aroclor 1254. Pretreatment with Aroclor 1016 reduced the duration of paralysis by about 50%. In control, Aroclor 1016- and Aroclor 1254-pretreated, rats, hexobarbital-induced sleeping times were 101, 48, and 24 min, respectively. Stimulation of hexobarbital- and zoxazolamine-metabolizing enzymes is indicated by these *in vivo* experiments.

72-2668. Naik, M. N.; Jackson, R. B.; Stokes, J.; Swaby, R. J. (CSIRO, Div. of Soils, Private Bag No. 1, Glen Osmond, S. Australia, 5064). **Microbial degradation and phytotoxicity of picloram and other substituted pyridines.** *Soil Biol. Biochem. 4(3): 313-323; 1972.* (13 references)

The relationship of the chemical structure of 38 pyridine derivatives, including two herbicides, with their resistance to degradation by soil microorganisms under aerobic and anaerobic conditions and with their herbicidal activity were investigated. Picloram with five substituents, three of which were -Cl, persisted under aerobic and anaerobic conditions for more than 275 days and had the highest toxicity to lucerne *(Medicago sativa* L., Hunter River). Pyriclor (Daxtron) having four substituents, three of which were -Cl, had a similar persistence but a lower herbicidal activity. The 3,6-dichloropicolinic acid, with 2-Cl in three substituents, persisted for more than 160 days but had slightly lower toxicity to lucerne. Some non-chlorinated derivatives were also surpisingly resistant to degradation and phytotoxic. Attempts to make picloram and pyriclor more biodegradable while retaining herbicidal properties met with little success. Substitution of -OH for -Cl in the six position of picloram caused no change in its properties. Removal of -COOH did not affect persistence but reduced herbicidal activity more than 100 fold. Removal of -Cl from the 5 position and $-NH_2$ reduced phytotoxicity 10-fold. Replacing -OH by $-NH_2$ in pyriclor resulted in little change in persistence but greatly lowered herbicidal activity.

72-2669. Nowicki, H. G.; Norman, A. W. (Dept. of Biochem., Univ. of Calif., Riverside, CA 92502). **Enhanced hepatic metabolism of testosterone, 4-androstene-3,17-dione, and estradiol-17β in chickens pretreated with DDT or PCB.** *Steroids 19(1): 85-99; 1972.* (35 references)

In the presence of a TPNH-generating system (reduced triphosphopyridine nucleotide), liver post mitochondrial fraction from White Leghorn cockerels or pullets metabolized carbon-labeled testosterone, estradiol-17β, and 4-androstene-3,17-dione *in vitro.* Oral treatment of one-wk old chicks of either sex with *o,p'*-DDT or *p,p'*-DDT at 1 mg/day for seven days increased the *in vitro* rate of metabolism of the steroids approximately 3-fold by increasing the formation of polar metabolites. The polychlorinated biphenyls (PCBs), Aroclor 1254 and Aroclor 1260, tested in one-wk old cockerels, also caused a 3-fold increase in metabolism of the steroids. Pretreatment with the chlorinated hydrocarbons did not significantly effect the conversion of the steroids to nonpolar metabolites.

72-2670. Hogan, J. W. (Fish-Pestic. Res. Lab., US Bureau Sport Fish. and Wildl., Columbia, MO 65201). **Brain acetylcholinesterase from cutthroat trout.** *Trans. Amer. Fish. Soc. 100(4): 672-675; 1971.* (15 references)

Brain AChE from cutthroat trout was characterized and inhibitors were tested. The carbamate, eserine, was the most effective inhibitor tested, having a pI50 of 6.8. For dichlorvos, paraoxon, 62C47 1,5-bis (4-trimethylammonium phenyl) pentan-3-one diodide malathion, and DEP the pI50's were 6.1, 5.4, 5.0, 4.4, and 4.1, respectively. The ester hydrolyzing enzymes in cutthroat trout brain were found to be similar in response to inhibitors to those of bluegill and channel catfish brains.

72-2671. Merna, J. W.; Bender, M. E.; Novy, J. R. (Inst. Fish. Res., Michigan Dept. of Natur. Resour., Ann Arbor, MI). **The effects of methoxychlor on fishes. I. Acute toxicity and breakdown studies.** *Trans. Amer. Fish. Soc. 101(2): 298-301; 1972.* (13 references)

The rate of breakdown of methoxychlor in distilled water was not pH-dependent, and the half-life of the compound was estimated to be 270 days. In water from several creeks, the half-life varied between 7 and 18 days and methoxychlor accumulated in the particulate fraction. TL50 values obtained in 96-hr static bioassays, 7.5 μg/l. for fathead minnows and 30.0 μg/l. for yellow perch, were considered unreliable because exposure time

to the nominal concentration was very short. In continuous-flow studies 96-hr TL50 values were 7.5 μg/l for minnows and 20 μg/l.for perch.

72-2672. McCann, J. A.; Jasper, R. L. (Pestic. Regulation Div., Environ. Protect. Agency, Agr. Res. Cent., Beltsville, MD 20705). **Vertebral damage to bluegills exposed to acutely toxic levels of pesticides.** *Trans. Amer. Fish. Soc. 101(2): 317-321; 1972.* (10 references)

Vertebral injury and hemorrhaging in bluegill fingerlings generally occurred at the 24-hr LC50 for the pesticide formulations tested. Neguvon (trichlorfon) caused injury but was not lethal at 53 ppm, the highest concentration tested. The degree of disturbance of the fish during the tests affected the incidence of damage. Akton was the most active hemorrhage-producing chemical (59.9%), followed in order by Dyrene (42.8%), phosalone (28.1%), Neguvon (trichlorfon) (18.5%), methyl parathion (11.1%), Dylox (trichlorfon) (6.5%), and demeton (2.4%). Demeton had the lowest LC50 (0.0697 ppm). Dyrene, phosalone, and methyl parathion had a reaction time of less than 6 hr under conditions of stress, while reactions to Akton and Dylox occurred at approximately 12 hr. Serial sections of areas of hemorrhage frequently revealed fractural centra, spines, and arches, and disoriented surrounding tissue. Lateral spinal curvature was observed in the caudal area. Methyl parathion, Akton, Dyrene, and phosalone, in decreasing order, also increased excitability of the fish.

72-2673. Derr, S. K.; Zabik, M. J. (Dept. Entomol., Pestic. Res. Cent., Michigan State Univ., East Lansing, MI 48823). **Biologically active compounds in the aquatic environment: the uptake and distribution of [1-1-dichloro-2,2-*bis*(*p*-chlorophenyl) ethylene], DDE by *Chironomus tentans* Fabricius (Diptera: Chironomidae).** *Trans. Amer. Fish. Soc. 101(2): 323-329; 1972.* (21 references)

A dose-related uptake of *p,p'* DDE was observed at every concentration and during each stage when the midge C. *tentans* was exposed to 0.07-2.2 ppb in the water. The last instar concentrated DDE from 14,000 to 20,000 times over the level present in the water. Accumulation was exponential with increased concentration at a given exposure time and a state of equilibrium was reached in 22-25 days. Concentrations of DDE from 0.5-2.2 ppb appeared to shorten the developmental period. From residue distribution on a μg/insect basis in each developmental stage, it was determined that a significant portion of DDE residue was eliminated by egg deposition. Egg masses contained 11-30% of the total DDT residues in adult females. Exuviae were apparently not a major route of elimination of DDE from the pupa.

72-2674. Gibson, H. R.; Chapman, D. W. (Idaho Coop. Fish. Unit, Univ. Idaho, Moscow, ID). **Effects of Zectran insecticide on aquatic organisms in Bear Valley Creek, Idaho.** *Trans. Amer. Fish. Soc. 101(2): 330- 343; 1972.* (15 references)

No significant differences in fish mortality or changes in growth rate or abundance of fish were observed in Bear Valley Creek, an area sprayed with Zectran, compared to the unsprayed Hayden Creek. Mean condition factors between streams for O+, 1+, 2+, and 3+ age fish were not significantly different between streams, and only different within streams in the case of 2+ age fish. Emigration and intrastream movement were not affected by spraying. No effects of Zectran were observed on numbers of nine families of aquatic insect nymphs or larvae or on insect growth. About three hr after spraying, the numbers of drifting terrestrial insects increased sharply. A single application of Zectran apparently damaged aquatic organisms very little over the one-yr period of observation.

72-2675. Hansen, D. J. (Environ. Protect. Agency, Gulf Breeze Lab., Sabine Island, Gulf Breeze, FL 32561). **DDT and malathion: effect on salinity selection by mosquitofish.** *Trans. Amer. Fish. Soc. 101(2) 346-350: 1972.* (5 references)

The effect of DDT and malathion on salinity selection by mosquitofish, *Gambusia affinis*, was studied. The fish were acclimated to a salinity of 15% for at least two weeks before testing and groups of five were exposed to the toxicant for 24 hours in a tube through which water of acclimation conditions flowed. The pesticides of varying concentrations were dissolved in polyethylene glycol and metered into the tube by syringe pumps. A fluviarium was used to produce the salinity gradient in which the fish were tested for preference. In the gradient's presence unexposed fish usually selected salinities of less than 10%, returning frequently to the same salinity. Mosquitofish exposed to 5, 10, or 20 ppb DDT selected significantly greater salinities (about 15%) than did unexposed fish. Malathion did not affect the salinity preference at the levels tested. Neither pesticide completely interfered with the capacity to discriminate. The selection of higher salinities may indicate that DDT affected the sensitivity of the nerves to stimuli, or that the fish were compensating for a change in osmoregulatory ability.

72-2676. Lowe, J. I.; Parrish, P. R.; Wilson, Jr., A. J., Wilson, P. D.; Duke, T. W. (Pesticides Office, Environ. Protect. Agency, Gulf Breeze Lab., Sabine Island, Gulf Breeze, FL.). **Effects of mirex on selected estuarine organisms.** *Trans. Amer. Wild. Natur. Resour. Conf. 36:171-186; 1971.* (10 references)

The results of laboratory experiments in which shrimp, blue crabs, fiddler crabs, and pinfish were exposed to mirex (a component of fire ant bait) are summarized. Juvenile brown and grass shrimp died after exposure to mirex at levels as low as one particle of bait per shrimp in standing sea water. Juvenile pink shrimp died after exposure to technical mirex dissolved in flowing sea water. Of these 25% died during a 7-day exposure to 1.0 ppb of mirex, and the rest died within four days after being returned to mirex-free sea water. Exposure of blue crab to 1 particle of treated bait per crab caused significant mortality. Exposure of fiddler crabs to mixed levels of mirex bait equivalent to a field application (1.4 kg per hectare) caused 73% mortality. Juvenile pinfish concentrated high residues of mirex but were seemingly unaffected by it. Mirex can be transferred through simple food chains, as manifested by juvenile blue crabs which died in 2 wk after eating grass shrimp killed by mirex exposure. Symptoms of poisoning in juvenile blue crabs which had ingested mirex contaminated fish included irritability, loss of equilibrium, and paralysis, followed by death. The insecticide mirex remained in the fire ant bait after nine months of soaking in sea water (about 34%).

72-2677. The Ministry of Agriculture, Fisheries and Food. (London, England). **Bromophos: a note and recommendations.** *Trop. Stored Prod. Inform. 19 : 21-24; 1970.* (5 references)

Bromophos has a low mammalian and avian toxicity. The acute oral LD50 for rats ranges from 3750-5050 mg/kg body weight and the acute dermal toxicity for rabbits is 8750 mg/kg. Feeding tests have shown that the chronic oral toxicity to rats is very low; 188 mg/kg/day for 100 days had no effect. Dogs are more susceptible: 87.5 mg/kg killed an average of one out of six dogs after eight weeks. Since action of bromophos is slow, ample time is available for medical treatment. Animals adapt to chronic exposure; after initial depression the cholinesterase level rises. Symptoms include headaches, irritability, and weakness of the legs. Bromophos is also dangerous to fish; ponds, waterways, and ditches should not be contaminated with the chemical or a used container. A list of precautions for bromophos use is provided.

72-2678. Tomatis, L.; Turusov, V.; Terracine, B.; Day, N,; Barthel, W. F.; Charles, R. T.; Collins, G. B.; Boiocchi, M. (Int. Agency for Res. on Cancer, 69 Lyon 6, France). **Storage levels of DDT metabolites in mouse tissues following long term exposure to technical DDT.** *Tumori 57(6): 377-396; 1971.* (55 references)

Storage of DDT and its metabolites in mouse tissues was investigated at two different research centers following long term administration of DDT (from 2-250 ppm) in the diet. A direct, generally linear relationship was obtained between the concentration of each metabolite (except *o,p'*-DDT) in each organ and the dose to which the animal was exposed. Levels of *o,p'*-DDT were highest at lowest doses of DDT. No difference in response was noted between the parent and the first generation. Pregnant F_2 females had much lower residues. Fat contained the highest level of all four residues, followed by reproductive organs, kidney, liver, and brain. In all but the liver, *p,p'*-DDT was most prevalent and *p,p'*-DDE was least prevalent. Liver generally contained a higher residue of *p,p'* DDD. Females tended to store more than males in reproductive organs and fat. Fetal litters contained concentrations of metabolites proportional to the dose fed the mother. In fetuses and placentas *p,p'*-DDT and *p,p'*-DDD (TDE) were the main metabolites present. Whole body DDT increased significantly shortly after birth, probably as a result of high DDT intake in the milk. High individual variation was noted throughout the experiment. A comparison with published data revealed several differences between storage in mice and in humans.

72-2679. Johnson, W. P.; Alford, B. T.; Drain, J. J. (Agr. Div., Amer. Cyanamid Co., P.O. Box 400, Princeton, NJ 08540). **Safety of famphur to young Brahman heifers, bulls, and steers.** *Vet. Med. Small Anim. Clin. 67(6): 686; 1972.* (3 references)

Famphur applied topically at the recommended dose of 40 mg/kg was found safe for Brahman calves. No illness was noted with the recommended dose although at 24 hr erythrocyte values were 57%, 64%, and 67% of pretreatment values for bulls, steers, and heifers, respectively. Serum glutamic oxaloacetic transaminase was normal and average hematocrit and hemoglobin values and erythrocyte counts were slightly depressed. Average total leucocyte counts expressed as percent of pretreatment levels were 116 (bulls), 128 (steers), and 92 (heifers). One of the bulls exhibited anorexia and slight salivation about 5 hr after treatment. There was a 6 hr period of low activity. At 48 hr after the second treatment average erythrocyte ChE values were 44%, 45%, and 49% of pretreatment values in bulls, steers, and heifers, respectively. No other determinations were performed at this dose.

72-2680. Hall, C. A.; Ludwig, P. D. (Agr. Dept., Dow Chemical Co., Lake Jackson, TX). **Evaluation of the potential use for several organotin compounds against the sheep blowfly (*Lucilia* spp.).** *Vet. Rec. 90(2): 29-31; 1972.* (7 references)

Several organotin compounds were investigated for use as insecticides against the sheep blowfly. Based on dermal application of each compound to three mice the

following LD50 ratings in mg/kg were suggested: triethyltin chloride > 35-40; trimethyltin approx. 50; hexamethyl di-tin approx. 50; trimethyl cyanoacetoxy tin > 87; trimethyl isothiocyanato tin > 30; trimethyl 1-morpholino (thiocarboxyl) thio tin, > 60; and trimethyl pentachlorophenoxy tin > 80. Dermal application to sheep of doses of approximately 25 mg/kg, 2 to 3 times that needed for control, did not result in signs of clinical intoxication immediately after treatment or in the subsequent period of 5-6 wk.

72-2681. Heywood, R.; Sortwell, R. J.; Kelly, P. J.; Street, A. E. (Huntingdon Res. Cent., Huntingdon, England). **Toxicity of sodium chlorate to the dog.** *Vet. Rec. 90(15): 416-418; 1972.* (12 references)

Sodium chlorate, a commerical preparation marketed as a weed killer, was tested for toxicity in beagles. The acute administration of 1 g/kg and 2 g/kg to two groups of four dogs each was rejected by all the animals, which vomited between 5 and 15 min after dosing. At working strengths of 8-9% w/v it was also unacceptable in solution. Repeated dosage for five days at levels above 300 mg/kg produced marked clinical symptoms and hematological and biochemical changes; this was not the case at dosages below 300 mg/kg. The results were consistent with the accepted low level toxicity of sodium chlorate. The LD50 could not be determined, however, because of its non-acceptance by the dogs.

72-2682. Neyman, I. M. (Carcinogen Lab., Inst. of Nutr., Acad. of Med. Sci. USSR, Moscow, USSR). **Kantserogennyye veshchestva v pishchevykh produktakh. (Carcinogenic substances in food products.)** *Vop. Pitan. 30(1): 24-31; 1971.* (80 references) (Russian)

Literature and data on various carcinogenic substances found in food products are discussed. A number of chemicals have been prohibited including pesticides such as DDT, methoxychlor, Aramite, 3-amino-1,2,4-triazole (amitrole), maleic hydrazide (MH), thiourea, thiuram, and 8-oxyquinoline (8-quinolinol). The harmful effects of agricultural chemicals are not always apparent and their carcinogenic or noncarcinogenic properties have not been determined. Carbamate pesticides have caused malignant tumors in rats; arsenic pesticides are not considered carcinogenic. Safe or minimal doses of carcinogens cannot be established since very small doses (μg) can cause malignant tumors and the effect of carcinogens are cumulative. New compounds should be used with care, and measures should be taken to lower the concentration of known carcinogens.

72-2683. Orlova, N. V.; Khovayeva, L. A.; Akincheva, M. Ya. (Pestic. Toxicol. Lab., Inst. of Nutr. of the USSR Acad. Med. Sci., Moscow, USSR). **Ob osobennostyakh vozdeystviya na teplokrovnykh zhivotnykh pestitsidov razlichnoy khimicheskoy struktury. [Specific features of different chemical structure pesticide action on warm-blooded animals.]** *Vop. Pitan. 30(6): 32-38; 1971.* (25 references) (Russian)

Male and female Wistar rats, treated with maneb or zineb (30 mg/kg P.O. for 5 months) developed treatment duration-dependent shifts in brain, liver, blood, and reproductive organ dehydrogenase and glutamate-oxaloacetate transaminases. Acetylcholinesterase was specifically inhibited in the male cerebellum; brain succinate dehydrogenase was inhibited in the female rat. Decreased glucose-6-phosphate- and succinate-dehydrogenase activities occurred in male reproductive glands. Decreased levels of SH-groups in low molecular weight compounds were found in the previously mentioned organs in both male and female rats. Kelthane (dicofol), administered in 10 mg/kg doses over the same experimental period produced selective effects of the liver enzyme systems. Liver 1-phosphate ketoaldolase levels decreased by 20% while blood levels of this enzyme increased by 75%; succinate dehydrogenase, glutamic-oxaloacetate transaminase, and tributyrinase activities were inhibited by 30, 50, and 19%, respectively. Dicofol produced specific inhibition of brain acetylcholinesterase in both male and female rats.

72-2684. Belova, R. S. (Saratov Res. Inst. Rural Hyg., Saratov, USSR). **Nekotoryye pokazateli toksichnosti gerbitsida 2,4-Dikhlorfenoksi-γ-maslyanoy kisloty. [Some indexes of 2,4-dichlorophenoxy-γ-butyric acid toxicity.]** *Vop. Pitan. 30(6): 72-73; 1971.* (3 references) (Russian)

Ascorbic acid and protein SH-group contents in albion rat liver, spleen, adrenals, and brain were used to establish the 2,4-dichlorophenoxy-γ- butyric acid (2,4-DB) toxicity threshold. Chronic experiments were performed over 350-400 days by p.o. treatment with 20.8, 10.4, 6.9, 5.2, and 3.4 mg/kg, corresponding to 1/100, 1/200, 1/300, 1/400, and 1/600 the LD50. Significant ascorbic acid level drops were found in all the investigated organs after treatment with 1/100 LD50. The same dose produced a significant SH-group content decrease only in the liver and spleen. Lower doses produced minor decreases of both parameters in the liver; however, this decrease was significant only in rats which received the 1/400 LD50 dose. The ascorbic acid test was more sensitive than the SH-group parameter.

72-2685. Shtenberg, A. I.; Ashmenskas, Yu. I.; Kusevitskiy, I. A. (Lab. of Pestic. Toxicol., Inst. of Nutr. of Acad. of Med. Sci. USSR, Moscow, USSR). **Izmeneniye immunobiologicheskoy reaktivnosti pod vliyaniyem nekotorykh pestidsidov iz gruppy karbaminovykh i ditiokarbaminovykh soyedineniy. [Immunobiological reactivity changes under the influence of some pesticides belonging to the groups of carbamate and dithiocarba-**

mate compounds.] *Vop. Pitan. 31(1): 58-63; 1972.* (13 references) (Russian)

Changes in the immunobiological reactivity due to chronic poisoning with daily oral doses of Sevin (carbaryl) (2 mg/kg), zineb (10 mg/kg), maneb (0.75 mg/kg), and ziram (2.5 mg/kg) were studied for nine months in female rats. The animals were immunized with typhoid vaccine during the second or third week of the experiment, and reinoculated two months after the initial immunization. A significant decrease in the agglutinin titers during the early stage of the experiment, particularly due to ziram, was observed. The complement activity of the blood serum decreased later during the test. Sevin and ziram inhibited the phagocytic activity of neutrophils in the ninth month. The phagocytic activity of neutrophils normalized four months after the termination of the poisoning; the agglutinin titers continued to be subnormal in all test groups; and the complement activity of the blood serum was at reduced levels in rats poisoned with Sevin and ziram. A slight decrease in the spleen immunoblast level during the poisoning was observed. The decreased gamma globulin and slightly increased protein coefficients normalized four months after the poisoning test. Histological and histochemical investigations of the liver and spleen in non-immunized rats revealed dystrophic changes and inhibition of RNA and polysaccharide reactions. Minor dystrophic changes in cellular elements, proliferation of Kupffer's cells in the liver, and of sinusal endothelium and neutrophilic and eosinophilic leukocytes in the spleen of immunized rats were observed.

72-2686. Shabad, L. M.; Kolesnichenko, T. S.; Nikonova, T. V. (Dept. of Carcinogen Studies, Inst. of Exp. and Clinical Oncol. of the USSR Acad. of Med. Sci., Moscow, USSR). **O vozmozhnosti blastomogennosti DDT. [On the possible blastomogenicity of DDT.]** *Vop. Pitan. 3(1): 63-66; 1972.* (23 references) (Russian)

The transplacental blastomogenic effect of DDT was studied on embryonal pulmonary tissue cultures of mice. Daily doses of 10 mg/kg and 50 mg/kg were administered to two different groups of strain A mice through gastric tube, and the effects of DDT were investigated on a total of 1,076 explants. Doses of 10 mg/kg stimulated growth of the Fl, F2, and F3 generations where a significant decrease in the frequency of dystrophic alterations was determined. The frequencies of preadenomatous alterations (diffuse and focal hyperplasia of the epithelium) in the F1, F2, and F3 generations were 8.9%, 16.4%, and 39.3%, respectively. The above frequency decreased to 30.1% and 20.1% in the F4 and F5 generations where adenomatous proliferation was observed. Doses of 50 mg/kg showed considerable transplacental action, increasing the frequency of hyperplastic lesions to 32.3% in the first generation where adenomatous proliferation was found in 9.6% of all cases. The results suggest a relatively low-level blastomogenic activity of DDT.

72-2687. Olefir, A. I. (Sci. Res Inst. of Occup. Health and Dis., Kiev, USSR). **Vliyaniye khimicheskikh veshchestv na formirovaniye priobretennogo immuniteta. [A study of the effect of chemical substances on the formation of acquired immunity.]** *Vrach. Delo 10: 125-127; 1971.* (Russian)

The effects of carbamates, chlorophos (trichlorfon), and DDT on the dynamics of typhus abdominalis antibody formation in rats were studied as were the immunogenic properties of rat serum in mice. The vaccination (three s.c. doses of 1,1, and 2 ml at seven day intervals) was started 2.5-3 months after the start of the experiment, and revaccination occurred after one month. The inhibition of the antibody formation was most pronounced during the initial phase of the immunization and prior to revaccination. While the effects of the different pesticides were not specific, the inhibition of the antibody formation by chlorophos and DDT was more powerful than by carbamate derivatives. The slightly elevated serum agglutinin levels 1.5 months after revaccination indicate a possible stimulation of the antibody formation by toxic substances during the final stage of the immunogenesis. The rat serum, transferred into mice two weeks after revaccination, failed to affect the mortality in the test group, which means that reduced antibody formation does not have to involve reduction of the serum's immunogenic effect.

72-2688. Yarosh, A. A. (Dept. of Neurol., Kiev Med. Inst.. Kiev, USSR). **Morfologicheskiye i gistokhimicheskiye izmeneniya v nervoy sisteme pri intoksikatsii metilmerkaptofosom. [Morphological and histochemical changes in the nervous system during intoxication with methyl mercaptophos.]** *Vrach. Delo 12: 101-103; 1971.* (3 references) (Russian)

Morphological and histochemical alterations in the nervous system of 40 white rats were studied after poisoning with methyl mercaptophos. Methyl mercaptophos at 10 mg/k_g was applied to the skin surface for five days; histological investigations were carried out on the 10th and 180th days of the experiment. Congestion in the meningeal vessels of the cerebrum, the cortex, the white substance, and the hypothalamic region, deformation of vessel walls, and aneurysmal protrusions were found on the 10th day of the experiment. Alterations of nerve cells, extensive perinuclear and peripheral chromatolysis, karyolysis, karyorrhexis, and tigrolysis were determined. Edema of the motor cells of the anterior spinal crescent with central and peripheral chromatolysis, and irritation and edema of the intervertebral ganglia occurred. The neuraxis and the myelin showed dystrophic alterations. Deformations, tumescence, and varicose protrusions of the cerebral vessels were found on the 180th day. Vacuolization, chromatolysis, and corrugation of nerve cells were determined. Vessels of the hypothalamic region showed perivascular edema and fibrin ptosis. Dystrophic alterations of ganglion cells in the spinal cord and peripheral nerves were found.

Reduced cholinesterase activity at the synaptic level was observed as well as reduced acid phosphatase activity in the cerebral and myelic neurons.

72-2689. Rebrin, V. G.; Aleksandrova, L. G. (Sci. Res. Inst. of Occup. Health and Dis., Kiev, USSR). **Toksikologo-gigiyenicheskaya kharakteristika gerbitsida ronita. [Toxico-hygienic characteristics of the new herbicide ronit.]** *Vrach. Delo 12: 118-121; 1971.* (9 references) (Russian)

Toxicological and hygienic investigations of ronit (Ro-neet, *S*-ethyl-*N*-ethyl-cyclohexyl-thiocarbamate) are described. The LD50 values, determined in white rats and mice for a 72% emulsion, were 2,323 and 2,285 mg/kg, respectively. A mortality of 20%, loss of condition, and hemorrhagic discharges from the eyes in a group of rats treated with 232 mg/kg doses over four months were determined, while 116 mg/kg doses proved ineffective. The results indicate low toxicity and slight cumulative effect, the cumulation coefficient being above 5. Repeated topical application of 115 and 230 mg/kg doses caused local irritation (hyperemia, edema, and plication) in rabbits. Physiological and hematological investigations of workers exposed to concentations up to 6.2 mg/m^3 over five consective days revealed no effects.

72-2690. Keil, J. E.; Sandifer, S. H.; Graber, C. D.; Priester, L. E. (Med. Univ. S. Carolina, Charleston, SC 29401). **DDT and polychlorinated biphenyl (Aroclor 1242). Effects of uptake on *E.coli* growth.** *Water Res. 6(7): 837-841; 1972.* (12 references)

DDT or polychlorinated biphenyls (PCBs) impregnated in filter paper discs at concentrations up to 1000 ppm did not inhibit growth of *E. coli* on trypticase soy broth agar. Growth of the organism, measured by mean harvest weights, was markedly stimulated by the addition of 0.01 and 0.1 μg/ml DDT and PCB in trypticase soy broth. Residue determinations indicated that 75% of the DDT was converted to TDE and 25% to DDE. Levels of DNA and RNA were not significantly different between treatments after 24 hr; however, differences may have occurred earlier. Uridine uptake at several phases of growth was not significantly affected by DDT. At 5 hr uptake was diminished in PCB-treated bacteria.

72-2691. Wotschokowsky, M. (E. Merck, Chem. Forsch., Abt. Pflanzenschutz, Darmstadt, Germany). **Zum Metabolismus von Flurenol-*n*- Butylester in hoeheren Pflanzen, [Metabolism of flurenol-*n*-butyl ester in higher plants.]** *Weed Res. 12(1): 80-89; 1972.* (8 references) *(German)*

Following application of ^{14}C-labeled flurenol-*n*-butyl ester (9-hydroxy-fluorene-9-carboxylic acid, *n*-butyl ester) to the leaves of *Phaseolus vulgaris*, the metabolism of this systemic growth-regulator was examined. The structure of two isomeric β-glucosides was elucidated, and four other polar metabolites were isolated and characterized. (Author abstract by permission)

72-2692. Perlovskaya, E. D. (Kirghiz Inst. of Epidemiol., Microbiol. and Hyg., Frunze, USSR). **Toksikologo-gigiyenicheskaya otsenka Fenurona. [Toxicological and hygienic assessment of fenuron.]** *Zashch. Rast. (Moscow)16(10): 40; 1971.*

Results of toxicological and hygienic investigations of fenuron are presented. Whereas fenuron was chemically stable in tap water under various conditions of aeration, illumination, temperature, and pH, 20% had decomposed by the 20th day in lake water containing 5-8 mg of oxygen per liter. Fenuron at concentrations up to 2 mg/l. had no influence on the biochemical oxygen demand, pH value, or ammonification and nitrification processes in reservoirs. A slight odor and astringent taste of water were detected at concentrations exceeding 21 m/l. Oral LD50 values, determined for various test animals, ranged from 3200 to 7550 mg/kg, and a limit dose of 300 mg/kg was established for guinea pig. Administration of 20%, 10%, 5%, and 1% LD50 per day for 2-3 months caused no deaths in groups of albino mice, white rats, and guinea pigs. No local irritation of, or resorption by skin and mucosa were observed: the cumulative tendency of fenuron is negligible.

72-2693. Rakalska, Z.; Dzierzawski, A. (Dept. of Pharmacol. Toxicol., Vet. Inst., Pulawy, Poland). **Effects of (2–chloroethyl)-trimethylammonium chloride on the electrocardiogram of the rabbit.** *Zentralbl. Veterinaermed. Reihe A 18(5): 428-437; 1971.* (28 references)

The electrocardiograms (ECG) of rabbits given 50 mg/kg chlormequat chloride orally showed only slight and temporary differences from those of control animals. However, clear symptoms of exposure occurred including salivation, increased urination and defecation, depression, and loss of appetite. Symptoms started at 30 min with 100 mg/kg chlormequat chloride, and more serious ECG changes were found. A significant depression of the S-T segment appeared as early as 30 min in some animals, accompanied by several wave amplitude changes including an increase of $R_{1,2}$ and $T_{1,2}$. Respiratory failure was observed. In the last 10 to 15 min before death, which occurred in six out of eight animals, dramatic ECG changes appeared as a significant sinus bradycardia and arrhythmia. Clinical and ECG symptoms observed were probably due to a stimulating effect of the compound on parasympathetic nerve endings similar to that of ACh.

72-2694. Zamfir, G.; Avadanii, R.; Nastase, V.; Cordu-Tarabuta, G. (Inst. fuer Oeffentliches Gesundheitswesen

und Med. Forschung, Iasi, Rumania). **Experimentelle Untersuchungen ueber die chronische Wirkung von Pinetox 50% auf Laboratoriumstiere. [Experimental investigations on the effects of prolonged administration of 50% Pinetox preparations to laboratory animals.]** *Z. Gesamte Hyg. 17(5): 909-914; 1971.* (19 references) (German)

During the toxicity testing of Pinetox (toxaphene, 66-69% chlorine content), rabbits were given 5, 10, or 20% LD50 of toxaphene by stomach tube, three times a week, for 6 months. Animals in the two highest-dosage groups began to show symptoms of intoxication, such as trembling, anorexia, and hyperstimulation, a few days after the beginning of Pinetox administration. None of the rabbits in the highest-dosage group survived the fifth month. Animals in all treated groups lost weight. Initial decreases in blood protein and hemoglobin content were followed by partial normalization. The opposite trend, an increase followed by a decrease, was noted for the enzymes catalase and SGPT. The cholinesterase level was depressed in a dose-dependent manner throughout the experiment. The blood sugar level was a sensitive indicator of toxaphene poisoning in this study, increasing by as much as 50% during the first month of the study, and remaining elevated subsequently. Maximum Pinetox concentrations, proportional to the dosage, were found in adrenals, followed by the liver. Pinetox was also stored in spleen, lung, heart, kidney, adipose tissue, and brain. Morphological and physiological abnormalities were found in all organs investigated and were most marked in the highest dosage group. Cerebral hemorrhage and edema, and fatty dystrophy of the liver were prominent.

See also **72-2507** **72-2513** **72-2547** **72-2585** **72-2719**

72-2695. Hilton, H. W.; Nomura, N. S.; Kameda, S. S. (Hawaiian Sugar Planters Ass., Honolulu, HI 96822). **A simplified oxygen bomb combustion procedure for carbon-14 in agricultural materials and soils.** *Anal. Biochem. 49(1): 285-289; 1972.* (5 references)

The labeled herbicides GS-12853-^{14}C (2,4-bisamino-6-methoxy- *s*-triazine (ring-labeled)) and picloram-^{14}C (4-amino-3,5,6- trichloropicolinic acid (carboxyl-labeled)) were mixed with dry powdered sugarcane plant parts and burned in a Parr bomb to study the recovery of carbon-14. A KOH solution was placed inside the combustion chamber to absorb the $^{14}CO_2$ produced by combustion. The carbon-14 was precipitated as $Ba^{14}CO_3$ from aliquots of the K_2CO_3/-KOH mixture in the scintillation counting vials. A thixotropic gel, Cab-O-Sil, was used as a suspending agent, and the $BaCO_3$ was dispersed in the Cab-O-Sil by ultrasonic agitation to increase the counting efficiency. Recovery of carbon-14 as $Ba^{14}CO_3$ from fibers spiked with the labeled herbicides averaged 84.1% for picloram and 88.2% for GS-12853. It was also possible to determine carbon-14 from soil using this combustion method. After cellulose was added to air-dried soil and the mixture placed on a filter paper in the ignition cup, the recovery from four soil types spiked with picloram-^{14}C averaged 87.4%.

72-2696. Scheide, E. P.; Guilbault, G. G. (Dept. of Chem., Louisiana State Univ. in New Orleans, Lakefront Campus, New Orleans, LA 70122). **Piezoelectric detectors for organophosphorus compounds and pesticides.** *Anal. Chem. 44(11): 1764-1768; 1972.* (25 references)

A quartz piezoelectric crystal coated with a substrate has been used for the detection of small mass changes caused by the selective adsorption of organophosphorus compounds and pesticides. Incorporation of the crystal into a variable oscillator circuit and measurement of the change in frequency of the crystal due to the increase in mass allows a highly sensitive indication of the amount of organophosphorus compound present in the atmosphere down to the part per million level. Instrumentation is relatively inexpensive and can be easily used in the field. Analysis is nondestructive and requires very little time. AT cut quartz crystals with fundamental frequencies of 9.0 MHz were coated with various inorganic substrates and these were evaluated as to selectivity and sensitivity with respect to organophosphorus pollutants. Other parameters that affect the efficiency of the detector were also studied and evaluated. The detector has potential use as both an air pollution sensor and a specific gas chromatography detector. (Author abstract reprinted by permission of the American Chemical Society)

72-2697. Tindle, R. C.; Stalling, D. L. (Fish-Pestic. Res. Lab., Columbia, MO). **Apparatus for automated gel permeation cleanup for pesticide residue analysis. Applications to fish lipids.** *Anal. Chem. 44(11):1768-1773; 1972.* (12 references)

The gel permeation cleanup procedure for fish and other tissue extracts in pesticide residue analysis, previously reported by Stalling, Tindle, and Johnson, has been automated. The automated system allows unattended operation while processing up to 23 samples with the system as described. Reproducibility of recoveries was quite good (coefficient of variation 5%) and cross-contamination was estimated at less than 1%. The chromatography system was constructed from commercially available components so that other investigators may easily duplicate the device without the necessity for fabrication of special components. (Author abstract reprinted by permission of the American Chemical Society)

72-2698. ,Machin, A. F.; Morris, C. R. (Min. of Agr., Fish. and Food, Central Vet. Lab., New Haw, Weybridge, Surrey, England). **An inexpensive gas chromatograph for the detection and collection of labile organophosphorus compounds.** *Analyst 97(1153): 289-293; 1972.* (6 references)

A gas chromatograph suitable for use with labile organophosphorus compounds is described. It incorporates all-glass systems for detection and collection, with an exceptionally short distance from the column to the detector or collector. Easily exchanged thermionic and flame-ionization detectors are used. The instrument is simple, convenient, and cheap to make. The thermionic detector is sensitive to less than 1 pg of diazinon and responds linearly over a 5000-fold range. Fractions from 50 ng to 50 μg have been collected with 90 to 100 per cent efficiency. (Author abstract by permission)

72-2699. Harris, R. J.; Whiteoak, R. J. (Fisons Agrochem. Div., Chesterford Park Res. Sta., Nr. Saffron Walden, Essex, England). **The gas-chromatographic determination of barban and its major metabolites in crops.** *Analyst 97(1153): 294-299; 1972.* (9 references)

A method is described for the determination of residues of barban [4-chlorobut-2-ynyl *N*-(3-chlorophenyl)carbamate] and its major water-soluble metabolites in harvest grain (wheat and barley) and sugar beet. Hydrolysis of barban and its metabolites yields 3-chloroaniline. Bromine water quantitatively converts 3-chloroaniline into its tribromo derivative, which can be detected by electron-capture gas chromatography. The limit of detection is 0.01 ppm of barban. Mean recoveries of barban added to sugar beet, wheat, and barley samples are 84.0, 68.8, and 78.0 per cent, respectively. The possibility of interference from other herbicides is discussed. The method is more rapid than other published procedures and allows smaller samples to be extracted without loss of sensitivity. (Author abstract by permission)

72-2700. Aturyan, M. M.; Katvalyan, G. T.; Dovlatyan, V. V. (Armenian Agr. Inst., Yerevan, USSR). **Tonkosloynaya khromatografiya gerbitsidov. Identifikatsiya i analiz Krotilina, 2,4-D kisloty i yeye natriyevoy soli. [Thin-layer-chromatographic investigation of herbicides. Identification and analysis of Crotilin and 2,4-D acid and its sodium salt.]** *Army. Khim. Zh.* 24(12): 1085; 1971. (Russian)

Thin-layer-chromatographic investigations of crotilin and, 2,4-D acid and its sodium salt are reviewed. Aluminum oxide was used as an adsorbent, and ink and iodine vapors were used for the development. Combinations such as water-acetone and water-acetone-ammonium hydroxide were used as solvents. Neutral aluminum oxide should be used for the analysis of mixtures of crotilin and 2,4-D acid. Partial reaction of aluminum oxide with 2,4-D acid in aqueous medium was observed.

72-2701. Dobiasova, L.; Hejduk, J.; Novak, J. (Fysikalni Ustav Ceskoslovenske Akad. Ved, Prague, Czechoslovakia.) **Jodometricke stanoveni thalia po oxidaci Tl^+ na Tl^{3+} alkalickym dusitanem. [Iodometric determination of thallium following oxidation of Tl(I) to Tl(III) with nitrite.]** *Chem. Listy, 65(8): 859-862, 1971.* (17 references) (Czech)

The method designed for the determination of Tl in lithium-thallium tartrate is based on the oxidation of monovalent thallium to trivalent thallium with sodium nitrite or with gaseous NO'_2 in a medium containing 4-12 *N* hydrochloric acid. Subsequent iodometric titration of the trivalent thallium with 0.01 *N* thiosulfate solution using starch as an indicator follows. Thallium ions are oxidized quantitatively; only determinations in HCl above a concentration of 4 *N* were found to be reproducible. Excess nitrite and nitrogen oxides are removed with a saturated solution of urea or with amidosulfonic acid. Other metal and halogen ions are also oxidized by nitrite; the presence of these ions interferes with the method. The advantage is that organic ions (citric, oxalic acid etc.) do not interfere. The effect of Fe(III) on iodometric titration in an acid medium can be canceled by the addition of an alkaline fluoride or phosphate. The advantage over oxidation with Br-water lies in the sharper change at the equivalence point. The standard deviation of the determination is 0.15%.

72-2702. Lautenschlaeger, W.; Pahlke, S.; Toelg, G. (Max Planck Inst. fuer Metallforschung, Lab. fuer Reinststoffe, Schwaebisch Gmuend, Germany). **Anodisch oxydierte Aluminiumoberflaeche: Ein neues Adsorbens in der "Duennfilm-Chromatographie." [An anodically oxidized aluminum surface: a new adsorbent in "thin-film chromatography."]** *Fresenius Z. Anal. Chem. 260(3): 203-206; 1972.* (8 references) (German)

The preparation of a very thin chromatographically active Al_2O_3-layer on small aluminum plates or wires by a new anodic oxidation method is described. The excellent suitability of this Al_2O_3-layer for application to separations is demonstrated by the examples of "thin-film chromatographic" separations of a mixture of dye stuffs, some metal dithizonates and metabolites of the pesticide endosulfan in the ng and pg range. For the separation of the colorless endosulfan metabolites, endosulfate, endodiol, and endo ether, a special procedure was followed. The coated alumina plates were boiled in a 0.5 *M* boric acid solution for 4 hr, then rinsed, dried in water, treated with 1 *M* sodium dihydrogen phosphate, and activated at 110°C. The components were separated in the customary manner with cyclohexane chloroform (5:3), then sprayed with a 5×10^{-5}% solution of rhodamine B in acetone. The fluorescence quenching was observed under UV light. (Author abstract by permission, supplemented).

72-2703. Woggon, H.; Saeuberlich, H.; Uhde, W. J. (Zentralinst. fuer Ernaehrung, Deutsche Akad. der Wissenschaften zu Berlin, Potsdam-Rehbruecke, DDR). **Zur Analytik (Inversvoltammetrie) von Organozinnverbindungen und deren Abbau-bzw. Zersetzungsprodukten. [A contribution of the determination (anodic stripping method) of organo-tin compounds and their degradation and decomposition products.]** *Fresenius Z. Anal.. Chem. 260(4): 268-274; 1972.* (18 references) (German)

Organo-tin compounds are preferably used as stabilizers for PVC and as fungicides in agriculture. For separation and determination of these compounds TLC combined with spectrophotometry are suitable methods. In order to improve the sensitivity an anodic stripping method was developed. The influences of electrolysis potential, of electrolysis time, of volume of mercury drop, and of temperature respectively, on the peak height are described. The following compounds were studied: butyl-tin trichloride, octyl-tin trichloride, benzylstannic acid, dibenzyl-tin dichloride, and stannic chloride. The least detectable amount is about 3.4×10^{-7} moles per liter for all compounds. The standard errors vary between 7.5 and 16%. Proposals are made for the scheme of determination concerning migration and residue investigations. (Author abstract by permission)

72-2704. Herzel, R.; Lahmann, E. (Bundesgesundheitsamt, Inst. fuer Wasser-, Boden- und Lufthygiene, Berlin-Dahlem, Germany). **Insektizid-Bestimmungen in atmosphaerischer Luft mittels der Filtermethode. [Determination of insecticides in atmospheric air using filters.]** *Gesundh.-Ing. 93(7): 202-205; 1972.* (8 references) (German)

A high-volume sampler with glass fiber filters was used for the determination of insecticides in atmospheric air. The filter collection area was 414 cm^2. The samplers, drawing about 80 m^3 of air per hour, were placed on the roof of the Institute building in Berlin.

After the sampling time, the filters were removed from the apparatus, cut to size, and extracted in a Soxhlet extractor with hexane for 5 hr. The hexane extract was submitted for Florisil column cleanup and gas chromatographic analysis. When pesticide solutions were applied to the filter surfaces in laboratory experiments, the passage of air through the filters resulted in the removal of most of the pesticide applied within 24 hr. Losses by adsorption to dust and by volatilization without passage of air occurred only in the case of aldrin. Thus, caution is advised in the interpretation of results obtained from studies of insecticide content in air using the filter method.

72-2705. Samosvat, L. S.; Fedorova, L. N. (Dept. of Hyg. and Toxicol. of Pestic., Kiev Grad. Med. Inst., Kiev, USSR). **Determination of simazine, atrazine, and propazine in biological media by thin-layer chromatography.** *Hyg. Sanit. 35(9): 64-66; 1970.* (2 references)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(9): 422-424; 1970, see Abstract no. 71-2286.

72-2706. Soboleva, D. A.; Makarova, S.,V. (All-Union Res. Inst. of Plant-Protection Chemicals, USSR).s, Determination of residual "Methurin" (meturin) in water. *Hyg. Sanit. 35(11): 64-65; 1970.* (1 reference)

English translation; for an abstract of the original Russian article, *Gig. Sanit.* 35(11): 216-218; 1970, see Abstract no. 71-2770.

72-2707. Colosi-Esca, D. (Inst. De Sanatate Publica si Cercetari Medicale Cluj, Sectia de Igiena, Cluj, Rumania). **Contributii la determinarea din aer a malathionului. [Contributions to the determination of malathion in air].** *Igiena 20(5): 299-305; 1971.* (5 references) (Rumanian)

Malathion was determined in air samples by spectrophotometry of the yellow complex generated by its dimethyldithiosulfate constituent with divalent copper ions. Air was bubbled through two absorbers containing absolute ethanol at 200 ml/min, in amounts depending on its anticipated contamination. The alcohol solutions were then hydrolyzed with 0.5 *N* NaOH in a separatory funnel and treated with a ferric chloride reagent. Ten ml chloroform and 2 ml of 1% $CuSO_4$-$5H_2O$ were added. The layers were allowed to separate and the absorbance of the chloroform layer was determined at 420 nm. The procedure is suitable to malathion determinations in industrial environments.

72-2708. Kins, N.; Barandy, J. (Drew – A Div. of Pacific Vegetable Oil Corporation, Analytical Res. Dept., Boonton, NJ 07005). **Short method for the detection of chick edema factor in fats, oils, and fatty acids by electron capture gas chromatography.** *J. Amer. Oil Chem. Soc. 49(2): 115-117; 1972.* (6 references)

The official electron capture GC assay for chick edema factor (most likely 1,2,3,7,8,9-hexachlorodibenzo-*p*-dioxin) has been modified to shorten the assay time and eliminate the problems involved in the alumina column fractionation. Instead of the alumina fractionation following the extraction with 2,2,4-trimethyl pentane, a second sulfuric acid treatment and a caustic wash were applied just before the final sulfuric acid wash. This shorter method demands constant and attentive work, and a larger amount of impurities come through. It can be used as a fast screen but cannot be substituted for the official test method.

72-2709. Gehrt, A. J. (Moorman Mfg. Co., Quincy, IL 62301). **Methods for determining ronnel in feeds and mineral mixtures.** *J. Ass. Offic. Anal. Chem. 55(4): 710-713; 1972.* (5 references)

The official first action GLC method (electron capture detector) for ronnel in feeds, 38.126-38.129, is rapid and dependable, but has been found to give low ronnel recoveries with stored samples. A major study was made to determine whether the low results are due to decomposition or binding of the ronnel. Ronnel and trichlorophenol (TCP) analyses were made by GLC on a feed sample stored for 9 months; results showed that 29-33% of the added ronnel and 29-54% TCP (reported as ronnel) were recovered under various conditions, accounting for 58-87% of the original ronnel. Analyses for TCP made by hydrolysis gave similar results. The ronnel not accounted for was probably lost through degradation, followed by volatilization and/or sublimation on the container walls. This study indicates conclusively that degradation of the ronnel is a major cause for the low recoveries in stored feeds. A biological (housefly killing) assay was made on another sample of the stored feed and showed 41% of the ronnel remaining. Agreement between the GLC analyses and the biological assay, plus proof of ronnel decomposition in stored samples, are convincing evidence that the first action method determines the true ronnel content of the feed. The official first action GLC method for ronnel in feeds has been adopted as official final action. (Author abstract by permission)

72-2710. Webb, R. G.; McCall, A. C. (Southeast Water Lab., Environ. Protect. Agnecy, Athens, GA 30601). **Identities of polychlorinated biphenyl isomers in Aroclors.** *J. Ass. Offic. Anal.. Chem. 55(4): 746-752; 1972.* (15 references)

Twenty-seven PCB isomers in Aroclors 1221, 1242, and 1254 were separated and identified by matching both their GLC retention times and infrared spectra with known compounds prepared by the Gomberg or Ullmann reactions. The retention times of

the PCB are presented relative to *p,p'*-DDE. (Author abstract by permission)

72-2711. Bontoyan, W. R.; Jung, P. D. Pestic. Regul. Div., Environ. Protect. Agency, Beltsville. MD 20705). **Thin layer chromatographic detection of chlorinated hydrocarbons as cross-contaminants in pesticide formulations.** *J. Ass. Offic. Anal. Chem. 55(4): 851-856; 1972.*

Chlorinated pesticide contamination studies are reported in which a TLC method is used to analyze a variety of dust and liquid formulations. Eight g samples are extracted with 20 ml acetone, followed by elution with *n*-hexane on silver nitrate-aluminum oxide G TLC plates. This paper reports the results of a four-year study, using a large collaborative sampling, in which the detection limits and utility of the described procedure were examined. The method has been adopted as official first action for the detection of contamination by 0.01% aldrin, dieldrin, endrin, and technical DDT and by 0.05-0.10% chlordane, Strobane, and toxaphene. (Author abstract by permission)

72-2712. Carlstrom, A. A. (Chevron Chem. Co., Richmond, CA 94804). **Collaborative study of extraction method for paraquat aerosols containing hydrocarbons.** *J. Ass. Offic. Anal. Chem. 55(4): 857-859; 1972.* (5 references)

Hydrocarbons present in aerosol formulations interfere with the colorimetric step in the official final action method for paraquat in formulations, 6.160-6.163. To eliminate this interference, the oil is partitioned into *n*-pentane, leaving the paraquat in a sodium sulfate- alcohol-water phase. The standard deviation for analysis of aerosols containing 0.22% paraquat was 0.011, based on results from 18 analysts. The official final action method for paraquat has been revised to include the method for aerosol formulations containing an oil base and the revised method has been adopted as official final action. (Author abstract by permission)

72-2713. Rickett, F. E. (Cooper Tech. Bur., Berkhamsted, Herts, England). **Preparative scale separation of pyrethrins by liquid-liquid partition chromatography.** *J. Chromatogr. 66(2): 356-360; 1972. (13 references)*

Liquid-liquid partition chromatography at elevated temperatures was utilized for the preparative scale separation of all six esters from pyrethrum extract. Columns of Celite 545 were coated by passing nitromethane saturated with hexane through the column, and a precolumn of 200-mesh Celite and nitromethane was prepared. The mobile phase was changed to CCl_4-hexane (1:3) saturated with nitromethane when elution of pyrethrin I was almost complete. The least resolved components, jasmolin I and cinerin I, had a resolution of 1.03.

72-2714. Brookes, P. A.; Martin, P. A. (Allied Breweries Process Res. Dept., 107 Station Street, Burton-on-Trent, England). **Determination of total bromine and of bromate in barley and malt.** *J. Inst. Brewing London 78(2): 165-169; 1972.* (17 references)

Improved techniques for the determination of bromine and bromate in barley and malt were devised since published methods were found unsatisfactory. Bromate was determined directly on an aqueous extract of barley using an iodometric amplification reaction. Sodium molybdate/potassium fluoride reagent, potassium iodide solution, sulfuric acid, and starch solution were added to the extract and a titration was carried out with 0.02*N* sodium thiosulfate. Recoveries ranged from over 100% in wheat flour pellets and barley to as low as 85% in malt flour. Total bromine was determined using the same reaction after ashing the sample in an oxygen combustion flask and oxidizing the resulting bromide to bromate. It was necessary to dry steeped and germinating barleys for four hr at 105° in order to grind samples and obtain satisfactory combustion.

72-2715. Ishii, Y.; Yamashita, Y. (Agr. Chem. Insp. Sta., Min. of Agr. and Forestry, Kodaira-shi, Tokyo, Japan.) **[Separation and Identification of carbamate insectides by polyamide thin-layer chromatography.]** *Noyaku Seisan Gijutsu (Pestic. Tech.) 27: 21-24; 1972* (Japanese)

Because of the structural similarity of Japanese registered carbamate insecticides, it has been difficult to separate each component from residual mixtures on the TLC plate using silica gel. A method was developed using polyamide to separate and identify on one TLC plate seven insecticides: 1-naphthyl- (carbaryl), *o*-chlorophenyl- (CPMC), *m*-tolyl-(MTMC), *o*-isopropoxyphenyl- (propoxur), 3,5-xylyl- (XMC), *o*-propylphenyl- (MIPC), and *o-sec*-butyl-phenyl- (BPMC) *N*-methylcarbamate. A better separation could be achieved by two-dimensional TLC using a solvent mixture of *n*-hexane, ethyl acetate, and acetic acid (90:2:8) as a primary developer and a mixture of *n*-hexane, ethanol, and acetic acid (85:7:8) as a secondary developer. Solutions of the carbamates and the corresponding phenols in dichloromethane were spotted onto the polyamide plates, then developed for 12 cm. The plates were air-dried and then sprayed with a 0.5 *N* methanolic solution of KOH. After standing for 30 min at room temperature, the plates were sprayed with a 0.05% acetone solution of *p*-nitrobenzenediazonium fluoroborate. The carbamates examined formed azo dyes with colors ranging from blue through red; limits of detection ranged from 50 ng for CPMC to 800 ng for XMC.

72-2716. Tanaka, E; Adachi, M. (Zenkoren Agr. Tech. Cent., Hiratsuka-shi, Japan). **[Determination of substituted diphenyl ether herbicide residues in soil and rice**

plants by gas chromatography.] *Noyaku Seisan Gijutsu (Pestic. Tech.) 27: 25-29; 1972.* (Japanese) (4 references)

Analytical conditions for determining residues of three substituted diphenyl ether herbicides (I. 4-nitro-2′,4′,6′,-trichloro-, II. 4-nitro-2′,4′-dichloro, III. 3-methoxy-4-nitro-2′-4′-dichloro-diphenyl ether) were studied in extracts of soil, water, and rice plants. The herbicides, intentionally added to soil, were extracted with acetone, and the extract was partitioned into *n*-hexane. The *n*-hexane portion was poured onto a Florisil column and eluted with an ethyl ether-*n*-hexane mixture, the ratio of the two solvents being 15:85 for compounds I and II and 30:70 for compound III. The eluate was gas chromatographed. The residues in water were directly extracted with *n*-hexane. Residues in powdered rice straw, powdered rice, and rice bran were extracted in a Soxhlet apparatus with acetone. After the partitioning into *n*-hexane, the procedure was the same as for soil. For lipid-rich rice bran and unpolished rice, the *n*-hexane extract was treated with acetonitrile to remove the fat following the FDA method. The GC conditions were: a glass column (1 m length, 3 mm i.d.) packed with 2% silicone DC QF-1/ Chromosorb G 60-80 Mesh, column temperature 190°C, specimen evaporator and detector temperature 255°C, ^{63}Ni ECD, carrier gas N_2 at 80 ml/min. It was found that the column and the conditions were adequate for concurrent determination of nine diphenyl ether herbicides. The recovery of the compounds I and II was 100-115% and that of III was 74%.

72-2717. Nose, K. (Dept. Phythopathol. and Pest Insects, Nat. Inst. of Agr. Sci., Min. Agr. and Forestry, Kita-ku, Japan). **[On the colorimetric determination of dithiocarbamates.]** *Noyaku Seisan Gijutsu (Pest. Tech.) 27: 30-32; 1972.* (6 references) (Japanese)

Conditions for colorimetric determinations of diethyldithiocarbamates were examined and the results compared with those obtained via CS_2 determination. The extinction coefficient at 430 nm, corresponding to the 2:1 diethyldithiocarbamate: copper complex, was used in the determination. The reaction with cupric acetate was carried out in methanol following the method of Mylone (G. Zweig: *Anal. Method for Pestic., Plant Growth Regulators, and Food Additives III,* p. 119, 1964 Academic Press). The limit of detection corresponds to 3 μg of CS_2; i.e., 0.03 ppm in a 100 g specimen. The recoveries of sodium diethyldithiocarbamate were 80% (when 90 μg was added to 100 g of tomato), 92% (25 μ g added to the same), and 69.3% (49 μg added to 100 g of unpolished rice). In cabbage the blank was large enough to prevent use of the method.

72-2718. Agricultural Chemicals Inspection Station. (Min. of Agr. and forestry, Kodaira-shi, Tokyo, Japan). **[The official method of analyzing IBP, S-benzyl diisopropyl phosphorothiolate, emulsion concentrate.]** *Noyaku Seisan Gijutsu (Pestic. Tech). 27: 33-34; 1972.* (Japanese)

The article describes and explains the official method of determining *S*-benzyl diisopropyl phosphorothiolate, Kitazin-P. The active ingredient is isolated by TLC on a silica plate, developed with a mixture of *n*-hexane, ethyl acetate, and acetone (7:3:1 v/v) and irradiated under UV light, then dissolved in methanol and decomposed by heating with a mixture of sulfuric and nitric acids. After addition of a solution of ammonium metavanadate and a molybdate reagent, the extinction coefficient of the mixture at 420 nm is compared with that of a standard calibration curve already recorded with freshly prepared ammonium phosphomolybdate. In adopting the analytical processes, careful evaluation occurred for the selection of an appropriate developing solvent which separated effectively, makes the absorbed zone as narrow as possible, is stable, and is easily removed from the silica of the TLC plate. The sulfuric-nitric acid mixture was a more effective decomposing agent for Kitazin-P than was perchloric acid.

72-2719. Kutlukova, U.; Lankina, T. A.; Khikmatov, A. (Inst. Chem., Uzbek SSR Acad. Sci., USSR). **Polyarograficheskiy metod opredeleniya 2-khlor-4-nitroformanilida v razlichnykh ob"yektakh. [Polarographic determination of 2-chloro-4-nitroformanilide in various materials.]** *Uzb. Khim. Zh. 15(6): 13-15; 1971.* (2 references) (Russian)

Polarography was used to determine 2-chloro-4-nitroformanilide in dust, soil, blood, and urine samples. The LP-60 instrument of 1:10,000 sensitivity was equipped with an electronic recorder, platinum anode, and a mercury reference electrode and cathode; 0.2*M*/1. lithium perchlorate solution in acetonitrile was used as the supporting electrolyte. Under the above conditions, a half-wave potential of 1.72 volt for the anodic oxidation of 2-chloro-4-nitroformanilide was determined. In another series of experiments, known amounts of the herbicide were added to soil in an alcohol solution; extraction was made with methyl alcohol. The procedure was used to study the distribution-excretion dynamics of the herbicide in rabbits where it was found without alteration in blood after p.o. administration.

72-2720. Osetrov, V. S.; Metelev, V. V. (All-Union Inst. Exp. Vet. Med., USSR). **Metody indikatsii mollyuskotsida 5,4′-dikhlorsalitsilanilida v vode i rybe. [Methods for the determination of 5,4′-dichlorosalicylanilide in water and fish.]** *Veterinariya (Moscow) 47(9): 93-94; 1971.* (Russian)

A photocolorimetric method for quantitatively determining 5,4′- dichlorosalicylanilide (DCSA) in fish tissue and water samples was devised. DCSA was extracted from water with amyl acetate-hexane in a 450:50 solution; extraction from fish used acetone. A stable red complex of DCSA and safranine was formed

at pH 9-9.5 and 0.1-2.5 μ g/ml concentration. A green number six filter was used to read absorbance. The recovery rate for water was 84%; that of fish tissue was 80%.

72-2721. Nikitin, P. I.; Kamuz, Yu. P. (Author address not given.) **Ekspressnyy metod opredeleniya Sevina v vozdukhe. [Rapid method for the determination of Sevin in the air.]** *Voyenno-Med. Zh. 11: 47; 1971.* (Russian)

A rapid method is described for the determination of Sevin (carbaryl) in air. The method requires 7-10 min for the determination at a lower limit of detectability of 0.5 gamma and is based on the ability of Sevin to decompose into fluorescing alpha-naphthol in an alkaline medium. An air sample of 40 l. taken by the aspiration method at a rate of 400 ml/min, is passed through hygroscopic cotton wool which was previously treated with a mixture of 0.1*N* sodium hydroxide and 50% ethanol for the absorption of Sevin. Sevin in the cotton wool is then detected in ultraviolet light, where it produces a greenish-blue luminescence.

72-2722. Kuchinskiy, A. L. (Mogilev Dist. Sanit. and Epidemiol. Sta. Mogilev, USSR). **K voprosu ob ekstraktsii DDT i geksakhlorana iz nekotorykh produktov rastitel'nogo i zhivotnogo proiskhozhdeniya. [On the extraction of DDT and hexachlorane (BHC) from some canned foods of animal and vegetable origin].** *Vop. Pitan. 31(1): 93; 1972.* (Russian)

A simplified method is described for the extraction of lipophilic pesticides from canned foods such as jams, jellies, mushroom, fish, and sour cream for thin-layer chromatographic or other determinations. Pesticide residues are extracted together with fat from the homogenized sample, previously teated with anhydrous sodium sulfate, by means of diethyl ether. After the diethyl ether is distilled off in water bath, the pesticides are extracted from the fatty residue with a mixture of acetone and water. The above method, applied to the extraction of DDT and hexachlorane for thin-layer chromatographic and colorimetric determinations, yielded recovery rates of 80-96%.

72-2723. Bernard, M. A.; Borel, M. M.; Chauvenet, G. (Lab. de Chimie Mineral B, UER de Sciences, Univ. de Caen, France). **Dosage des dithiocarbamates en milieu non aqueux. Note de laboratoire. [Determination of dithiocarbamates in non-aqueous media. Laboratory note.]** *Bull. Soc. Chim. Fr. 4: 1663-1664; 1972* (French)

Results of potentiometric titrations of metallic carbamates and of dithiocarbamates carried out in glacial acetic acid were identical, whereas results in acetic anhydride differed for the two types of compounds. The solvolysis observed for carbamates in acetic acid did not occur with the sulfur-containing compounds. This is in accord with the generally greater stability of dithiocarbamates than carbamates.

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